...LY MAGAZINE FOR MANUFACTURERS & BUSINESSMEN

. XLI. CALCUTTA, OCTOBER, 1950.

MIRACLE MAN WITH UNRIVALLED POWER

Everybody in this country is aware of the fact that India's unrivalled and greatest palmist, Tantric, Yogi vastly learned in the Astrology and Astronomy of the East and the West, gifted with supernatural power of predictions, President of the Internationally famed Baranashi Pandit Maha Sabha of Benares and All-India Astrological and Astronomical Society of Calcutta.

Raj-Jyotishi

Jyotishsamrat Pandit Sri Ramesh Chandra Bhattacharyya, Jyotisharnab, Samudrikratna, Jyotish-Shiromani Raj Jyotishi M.R.A.S. (Lond.) has won unique fame not only in India but throughout the world (*e.g.*, in **England, America, Africa, China, Japan, Malaya, Singapore** etc.) and many notable persons from every nook and corner of the world have sent unsolicited testimonials acknowledging his mighty and supernatural powers. This powerfully gifted great man can tell at a glance all about one's past, present and, future, and with the help of Yogic and Tantric powers can heal diseases which are the despair of Doctors and Kavirajas, can help people to win difficult law-suits, and ensure safety from dangers, prevent childlessness and free people of family unhappiness. **His three important predictions** (prediction about the British victory on the very day—2nd September, 1939—of the declaration **of last World War**, prediction of the achievement of **independence by the Interim Govt. with** Pandit Jawaharlal as the Premier made on the 3rd September, 1946 and prediction regarding **the future of India and Pakistan** which had been sent to the Prime Minister of India on the 11th August, 1947 and subsequently published in various Newspapers) have proved correct to the detail amazed people the world over and have won for him unstinted praise and gratitude from all quarters including **His Majesty George the Sixth, the Governor of Bengal and eminent leaders of India.** He is the only astrologer in India who was honoured with the title of **"Jyotish-Siromani" in 1938** and **"Jyotishsamrat"**—Emperor among astrologers and astronomers—**in 1947 by the Bharatiya Pandit Mahamandal of Calcutta** and **Baranashi Pandit Maha Sabha of Benares**—a signal honour that has not been endowed on any astrologer in India so far. **Consulting Astrologer to the Eighteen Ruling Princes in India.**

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Industry

Editor,
K. N. Banerjee.

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FULL EMPLOYMENT FOR ALL

IN pre-war years people suffering from unemployment or under-employment took their misfortune lying down. They thought it useless to take up arms against evil stars which in their opinion guided their destiny in an irresistible manner.

The last two wars have however ushered in new ideologies and new class consciousness. It will therefore be hazardous for any established Government in the present structure of society to allow figures of unemployed to mount high. In fact unemployment is the most favourable condition for the spread of disaffection among the labouring classes who may ultimately be brought together under a banner subscribing to socialist or communist views.

It is therefore being increasingly felt that if the surging tide of communism which is spreading its tentacles is to be checked, there is no course left but to take up seriously the programme of full employment in the homefront.

The United Nations Organisation which stands as a sturdy bulwark against Communism has therefore taken up this vital matter not a day too soon and has passed a resolution calling upon all Governments to do every thing in their power to ensure full employment in their respective territories, and to publish annually a statement of their economic objectives for the ensuing year accompanied by a statement relating to employment, production, consumption or investment.

The resolution is a milestone in the history of the UNO. It will revolutionise the society if something tangible is done in this respect and not allowed to be left as a mere scrap of paper. In one sense it over-rules international competition and discourages any measure in the economic sphere which would likely have a serious adverse effect on the balance of payments or employment levels of other countries. In the domestic sphere also it will mean bridging the gulf between the haves and havenots.

CURRENT TOPICS

FOUNTAIN PEN INK INDUSTRY

The manufacture of fountain pen ink in India is likely to receive a strong impetus, now that the foreign imports of the ink are going to be cut short. The existing revenue duty on imported fountain pen ink has been converted into a protective duty for a period of three years. The Tariff Board which was asked to enquire into the claim for protection of the fountain pen ink recommends that so long as the policy of licensing imports has to be continued for balance of payment considerations, the desirability of maintaining and expanding the indigenous production of fountain pen ink should be kept in view and the quantum of imports should be regulated accordingly. The Board also recommends that the Government should extend to the manufacturers all reasonable facilities for the procurement of modern machinery and appliances. All encouragement should be given to those manufacturers who are in a position to export fountain pen inks to foreign countries. It is also recommended that the Central and State Governments should give preference to the indigenous fountain pen inks in the purchase of their requirements. The question of providing better transport facilities and that of exemption from payment of octroi duty should be taken up. All units of the industry are however required to produce annual progress reports to the Board by January 31 of each year. Such reports should include statements regarding the supply of raw materials and other factors that may have a bearing on the efficiency of the industry. It is also desirable that the industry in order to be placed on a sound footing should form an all-India organisation comprising all the units in the country and should collect statistical data regarding production, imports, etc. and distribute such information to its member.

GLASS RESEARCH INSTITUTE AT JADAVPUR

While no doubt illiteracy is widely prevalent and serious efforts have to be made to combat it, India is fast making up the leeway in the higher reaches by establishing 11 laboratories of which the National Chemical Laboratory at Poona, the National Physical Laboratory at Delhi and the Fuel Research Institute at Dhanbad have already been opened. The one recently opened is the Central Glass and Ceramics Research Institute. Seven more institutes are being vigorously pushed along. Three out of them await opening in the next few months. The seven are:—

1. The National Metallurgical Laboratory, Jamshedpur.
2. The Central Food Technological Research Institute, Mysore.
3. The Central Drug Research Institute, Lucknow.
4. The Central Leather Research Institute, Madras.
5. The Building Research Station, Roorkee.
6. The Central Road Research Institute, New Delhi.
7. The Central Electro-Chemical Research Institute, Karaikudi.

Fourth in the chain of National Research Laboratories, the Central Glass and Ceramics Research Institute will satisfy a longfelt need. The Institute will conduct fundamental research having a bearing on the different branches of glass and ceramics. Its other functions will be testing and standardisation, technical assistance to the glass and ceramics industry, dissemination of information and

training of technologists for special work. The scope of its work includes research and investigation in glass, pottery and porcelain, enamels and refractories. Apart from fundamental research, an important function of the Institute will be to render technical help to the industry in the improvement of the quality of products and to induce the industry, by demonstrating the benefits of scientific processes, to utilize and adopt improved techniques in works operations. In the course of time, the Institute will encourage the factories to send their workers for short training courses so hat they may apply the knowledge so gained in manufacturing operations. Research staff will also be sent to visit factories in order that they may acquire factory experience. The institute will work in collaboration with industry, universities, other research organisations and Government departments for the collection of data and the dissemination of technical information. For this purpose, the Institute will also maintain a library for the use of workers and will organise a museum where a wide collection of finished articles, samples of raw materials in various regions, processed raw materials and other items of interest to the industry, will be displayed. A museum containing Indian glass and ceramic exhibits has already been set up in the Institute.

Technical work at the Institute started in 1948. One of the projects under study is the improvement of the quality of raw materials by treatments such as washing, magnetic separation, etc. Fundamental studies on the properties of raw materials of the glass and ceramic industries have been undertaken. Work on the study of talc available in India has been started. Important results have been obtained from researches now in progress on coloured glass, sintered glass, foam glass, etc. The work on foam glass has aroused great interest on account of its special physical properties, e.g. thermal insulation and buoyancy. A section for making refractory parts has also been organised and it is proposed to conduct trials on slip casting of pots required in the manufacture of optical glass.

SUPERPHOSPHATES

With each crop grown on the land the latter is depleted of phosphates, which if not replenished periodically, is likely to reduce the production considerably. It has been stated by soil experts that after each crop of rice 20 lbs. of active principle of phosphates are removed from an acre of land. Similar loss occurs through other crops grown on the soil. There is also a recognised relationship between the phosphatic contents in the soil and the health and productive capacity of animals which feed on crops grown in it. About 20 per cent of the bone weight in animals and human beings consists of phosphates and if the foods that are consumed are poor in phosphates, the result will be undermining the health of the Nation. It is therefore good to apply phosphatic manures on land to keep the balance in soil nutrition. It may be mentioned here that the Central Ministry of Agriculture is maintaining a Phosphatic Pool for the last three years. The fertiliser is distributed out of the Pool by State Governments which should make full use of the Pool and make it available to the agriculturists and domestic consumers for homecrofting.

IMPORT TRADE CONTROL

The system of Import Trade Control has suffered frequent changes in the last few months to the utter bewilderment of the Indian trades and industries. Of course changes in matter of details may be accounted for and have got to be made by all progressive Governments in consonance

with the international trends of trades and finance. But continuous changes in policies exhibit a lack of decision which is the outcome of far-sight and experience in handling matters affecting large interests of commerce and industries. Of course various steps for the administration of the control has been strengthened, increased powers have been delegated to the Import Controllers at the Ports and the licensing period is being extended, but the object for which these have been effected remains as unfulfilled as before.

In order, however, to determine what further action is required to improve the system of control, Government have at length considered it necessary to set up a comprehensive enquiry into the policy underlying Import Control and its administration. They have accordingly decided to appoint a Committee to enquire into this subject with the following terms of reference:

(1) To enquire into the working of Import Control with reference to (a) the procedure followed in the fixation of import quotas for individual commodities; (b) the procedure and methods followed in dealing with applications for Import licences; (c) organization of the existing machinery for Import Control; (d) any other matter incidental to the working of the Import Control Organization; and

(2) To make recommendations on the above subjects with a view to improving the efficiency of the Import Control Organization in such a way that applications for licences may be promptly dealt with and disposed of and the complaints against its present working may be removed. The Committee will consist of: (1) Shri G. L. Mehta, Member, Planning Commission (Chairman), (2) Shri Tulsidas Kilachand, President, Federation of Indian Chambers of Commerce and Industry (Member), (3) Shri D. L. Mazumdar, I.C.S., [illegible] Fiscal Commission (Member and Secretary).

It is encouraging that though rather belated the Government is settling down to practical business. Such a committee should have been appointed long ago. Those managing the Department placed too much reliance on their own competency and wisdom. Import trade control with its system of licensing has far-reaching effect on national economy and wields tremendous influence on trade, commerce and manufacturing industries as well. Changes every now and then should have a deterrent effect on their progress. We therefore welcome this new move on the part of the Government and hope that the new committee will evolve a policy that will best serve the country as a whole.

NEW TRADE AGREEMENTS

The Indo-Swiss Trade Agreement for the year 1949-50 expired on February 28, 1950. A fresh trade agreement with Switzerland has been ratified by the Governments of India and Switzerland. The Agreement comes into force with retrospective effect from March 1, 1950 and will remain valid up to February 28, 1951. Under the Agreement imports from Switzerland will consist of railway coaches, equipment for a machine tool factory, heavy electrical equipment and other capital goods; electrical and medical apparatus, textiles, watches and clocks, chemicals and pharmaceuticals, aluminium and aluminium products for industrial purposes and certain miscellaneous articles, such as kerosene lamps, synthetic stones, etc., valued in total at about Rs. 10.6 crores. Exports to Switzerland will consist of groundnuts, groundnut oil, linseed, hessians, coffee, manganese ore valued at about Rs. 3.04 crores and certain other items, viz., jute manufacture, [illegible]

[illegible] spices, essential oils, rubber goods, jewellery, tobacco, soap, vegetable cooking medium, handicrafts, jute and coir matting, etc.

The existing Trade Agreement with Western Germany also expired on the 30th June 1950, and a fresh agreement for the period from 1st July 1950 to 30th June 1951, has been signed on the 4th July 1950. India has agreed to export to Western Germany chemicals, textiles, fibres and bristles, manganese ore, mica, hides and skins, stones and earths, coffee, peanuts and peanut oil, spices, tea, linseed, tobacco, birds feathers, cattle horns, etc., valued at $26,425,000. Imports from Western Germany will include chemical and related products, machineries, metals products; non-ferrous metals, instruments and apparatus and iron and steel products valued at $26,420,000. These items are in addition to those which Indian businessmen are at liberty to export to or import from Western Germany within the frame work of the laws and regulations of the Governments concerned. The commodities included in the agreement are such as are regarded essential for purpose of import by the two countries. The agreement also provides for the employment of German Technicians in India and the training of Indian Technicians in Western Germany. There is also a provision for according usual facilities in respect of bunkering and other services and customary treatment in respect of duties, charges and taxes to the ships of the two countries.

DEVELOPMENT OF COTTAGE INDUSTRIES

The development of cottage industries as a necessary support to national economy is one of the few matters on which all schools of thought in the country are entirely agreed. Poor in capital and other resources, we have perforce to develop our economic activities along lines which permit to the maximum employment of workers in conjunction with relatively small quantum of capital and other resources. Cottage industries are also specially suitable for the absorption of our surplus agricultural and rural population and also for providing subsidiary occupations for the under-employed among them.

The important role of cottage and small-scale industries in the economy of a country needs no emphasis. Even in industrially advanced countries like U.S.A., Germany and U.K., small-scale industries play a distinctive role. A recent survey disclosed that in the home of giant enterprises viz. U.S.A., there were 800,000 industrial establishments with 1 to 4 workers.

Japan's phenomenal industrial progress within a course of 50 years was mainly due to a well co-ordinated system of cottage and small-scale industries. The role of cottage and small-scale industries in a country like India, where the population is mainly agricultural and where these industries have a long and historic past rooted in tradition, is already underlined. In the past cottage industries played the most important part in the economic life of the Indian people and the skill and the dexterity of Indian craftsmen were famed throughout the world.

The cottage industries in India, in spite of their huge potentialities, are now in a decadent state and require tender nurturing if they are to be revitalised and placed on a sound footing. The West Bengal Cottage Industries Board, recently constituted, met to define its functions and determine its immediate programme. The Committee has decided

that the functions of the Board should be fourfold: (1) To administer on behalf of the Central Government the funds available for the development of cottage industries, including any grants that might be made to the States for this purpose; (2) To initiate, execute and supervise schemes for the development of cottage industries; (3) To assist and advise, on behalf of the Central Government, the various State Governments in framing and executing their schemes relating to cottage industries; and (4) To assist in co-ordination the activities of the State Governments relating to cottage industries.

The drafting of the functions of the Board expresses a wish to do something for the revival of the Cottage Industry but wish is very little qualification for the performance of the scheme. We hope that the Board will pay greater attention to tangible work than to speculative deliberations.

REPORT ON WEIGHTS AND MEASURES

A special committee of the Indian Standards Institution has completed its report on the ways and means to standardise the numerous systems of weights and measures, in use in India, into one system. In order to put a stop to the source of fraudulent practices in trade and to terminate wasteful diversity, the Committee finds a solution in the adoption of the Metric System. The Committee's recommendations envisage a change-over to the Metric System in three stages extended over a period of about 15 years. The implementation of the recommendations will involve Central Legislation and the creation of an agency to co-ordinate all related measures for the change-over of the system.

—TEXTILE PRINTING

PRINTED cotton, silk and artificial fabrics have caught the fancy of the decent people. Only a few years ago it was simply the old-fashioned women who decked themselves with clothes printed in Turkey red colours. But now-a-days in schools and colleges, streets and parks, trams and buses, cinemas and theatres, meetings, social and ceremonial functions, there is to be found a play of variegated colours on saries and blouses, as well as on the curtains, chair cushions, table cloths, etc., etc. The highly priced Benares saries with gold borders and ornamental designs on them are now at a discount. It therefore requires no mention that textile printing may prove a profitable profession and we take this opportunity to present the methods which are now adopted to print on cotton and silk.

Of the various methods, the oldest and simplest is the hand block printing possessing qualities and advantages over all other methods except cylinder printing. The Perrotine only produces patterns of small scale and not exceeding four colours and successful continuous patterns are not possible by the flat press. By hand block printing patterns of large scale and containing any number of colours can be handled with ease. Where a pattern is too big to be cut on one block the repeat can be obtained from a series of blocks. Cylinder printing is preferable for designs where mechanical accuracy and delicacy of detail are involved, and when production costs have to be reduced to a minimum. But a comparison of the broad conventional treatment and rich transparency of colour obtained from a good block print, against the mechanical efficiency of a cylinder print, reveals the beauty of individual workmanship over mass production.

PRINCIPAL REQUISITES

The following are the principal requisites which all calico printers must be provided with at the very outset.

PRINTING TABLE

The first essential is a flat table on which the work of printing can be carried on with ease. It is generally made of wood and its dimensions can vary according to convenience, but should at all events be wider than the average width of cloth. The top of the table is covered with tightly stretched woollen blanket. At one end of the table brackets are placed for two rollers, on which are wound the back cloth and the printing cloth. The back cloth, on the lower roller, is of unbleached calico. It is placed between the blanket and the printing cloth to protect the former from the colour which penetrates through the cloth during the printing operation. At the opposite end of the table is a third roller used for the purpose of drawing forward the back cloth after a complete table length of cloth has been printed. The printed cloth is, at the same time, drawn forward and allowed to hang in loops from rollers suspended from the ceiling, until quite dry. Sometimes the cloth, after printing, is drawn by hand between steam heated, drying cylinders.

BRUSHES.

Among the other requisites may be mentioned brushes which must be small and stiff for setting the colours evenly on the pads in the tray. One brush for each colour in use must be used. For ordinary work a 6-in shoe brush may be suitably cut into three. The printers should also have near at hand small painters' brushes to remove any superfluous colour from the blocks.

Blocks.

Special attention should be paid to the blocks for printing the colours on. They should be artistic and of the best designs and should be replaced as soon as the impressions given out are blurred. Now blocks may be classified under two broad classes, viz., ordinary and combination blocks. Ordinary blocks are made use of when printing in only one colour is done while combination blocks which may consist of two or more blocks are meant for printing in more than one colour. One block for each colour as in ordinary printing is required and the complete effect is given when all the blocks comprising the full set have been used.

The hand-block varies somewhat in size, according to the pattern or work required; but it is commonly about 9 or 10 inches long and 5 or 6 inches broad with a handle at the back for the sake of convenience. The pattern is generally cut out in relief upon the tamarind wood, but this is liable to wear down very rapidly, so that it has been found greatly preferable to raise the pattern on the block by the insertion edgewise into the wood of narrow slips of flattened copper wire. These tiny fillets, being filled level on the one edge, are cut or bent into the proper shape, and forced into the wood by the taps of a hammer at the traced lines of the configuration. Their upper surfaces are now filed flat, and polished into one horizontal plane, for the sake of equality of impression. As the slips are of equal thickness in their whole depth, from having been made by running the wire through between the steel cylinders of a flatting mill, the lines of the figure, however much they get worn by use, are always equally broad as at first—an advantage which does not belong to wood-cutting. The interstices between the ridges thus formed are filled up with felt-stuff.

Sometimes a [illegible] made by the [illegible] the insertion of copper [illegible] the blocks are made of brass.

Steaming Apparatus.

This is absolutely necessary for [illegible] the colours.

Thickening Agents.

Thickening agents can be divided into two classes:—

1. Those which are used only as thickening agents and are ultimately completely removed from the fabric without affecting the colours, such as starch, gum senegal, gum arabic, gum tragacanth.

2. Those which combine the dual function of thickening and fixing and ultimately form an integral part of the colour, such as albumen, casein, glue.

The function of thickening agent is to enable the colour to be conveyed to the fabric easily and evenly, and prevent its spreading beyond the true limits of the pattern.

In deciding which thickening to use the nature of the fabric must be taken into consideration. Any cloth which is required to have a soft "touch" when finished should be printed with the gums which entirely wash away, such as senegal, arabic, tragacanth, or dextrin. For stiff materials starch is the best thickening. When the colour is required to penetrate to the back of the fabric gum tragacanth will be the most effective.

PREPARATIONS OF THE CLOTH BEFORE PRINTING

To obtain the utmost purity and brilliancy of colour in printing it is necessary that the natural impurities and foreign matters in the fabric be removed by either "bleaching" or treating with acids and alkalies. Fabrics of all kinds

can be obtained from shops and factories in a condition practically ready for printing, but no matter how clean they appear to be it is always advisable to wash them thoroughly in hot soapy water before commencing to print. This applies particularly to those fabrics obtained in the shops, for they are often heavily impregnated with various "finishing" materials which, if allowed to remain, prevent the dyestuff from penetrating deeply into the fibre.

The natural impurities in cotton, in the raw state and as yarn, consist of fatty acids, wax, colouring matter, and albuminous substances, amounting in all to about 5% of the weight of the material. Cotton cloth, in addition to the above, contains the various sizing materials, such as starch, wax, soap, etc., used to facilitate the weaving. Bleaching removes these impurities and leaves the cloth in such a condition that it is capable of absorbing evenly the various colouring matters or mordants applied to it. Alkaline solutions, acids, and oxidising agents are used. The alkalies (caustic soda, carbonate of soda, and milk of lime) form soaps with the fatty matters in the cloth; the acids (sulphuric, hydrochloric, and acetic) decompose the soaps; the oxidising agent (bleaching powder) removes the natural colour from the fibre. Copious washing takes place between each operation.

The preparation of silk for printing merely consists in mordanting with tin, but before mordanting it is generally advisable to thoroughly scour the silk, no matter how clean it appears to be.

The scouring is done by soaping for to 1½ hours in a 10% soap solution at °C. If during this operation the silk comes yellowish in colour, it is bleached a treatment of about five hours in a solution of 1 part peroxide of hydrogen, 10 s., a little ammonia, and 4 parts water. After a good washing it is mordanted with tin, which increases its affinity for dyestuff. This is effected by padding in a 5% solution of stannic chloride 140°Tw, and allowing to stay in a wet state for four hours. After washing and drying the cloth will be ready for printing.

METHOD OF PRINTING

The actual printing of the block calls for great care and concentration. In the first place mark very clearly on the back of the block the word TOP to correspond with the top of the pattern. This will help to prevent annoying accidents such as printing the block upside down. Then place the printing cloth on the table, securely fix it in position and rule guiding lines at right angles to the selvedge for the first row of repeats of the pattern. If this is not done the pattern is apt to work at the wrong angle and extra impressions will be required later to complete the printing of the cloth. Having done this, mix the dye, and prepare the colour sieve, and begin the printing.

Spread the thickened dye over the sieve with a wide flat brush, and gently press the face of the block upon it, taking care that every portion to be printed receives an adequate charge of dye. Too hard a pressure on the sieve will make the dye go on to the waste spaces of the block and possibly spoil the print. A new block takes time to get used to the dye and it is advisable to continue pressing it lightly upon the sieve until the surface is thoroughly saturated. When once this has happened it is only necessary to press lightly twice (in different directions), for the block to receive a sufficient charge of dye. With the block fully charged place it in position on the cloth which is to be printed. Hold it firmly with the left hand, and gripping the handle of the mallet in the right hand with the head resting by the thumb, strike the back of the block

twice with the end of the handle. When this is done correctly a good even impression is obtained. For each printing of the block the sieve is recharged with colour and the same series of operation repeated. Care must be taken to make each repeat join up as exactly as possible with the preceding impression.

It is advisable to print the table length completely with one colour before proceeding with the next. Two wet colours touching each other on the cloth are apt to spread. Where superposition of colour is employed to give a three colour effect by using two colours, it is absolutely necessary for the sake of crispness of printing to allow the first colour to dry before printing the second.

BLACK PRINTING

I

Aniline salt	5	tolas.
Potassium chlorate	2½	,,
Copper sulphate	1¼	,,
Gum mucilage	80	,,

Incorporate the solid ingredients in the gum mucilage. With this paste print the cloth by means of a hand block and hang up the cloth in the sun to dry. After 12 hours dip the cloth for some time into the hot solution of lime, soda ash or soap or immerse it into the cold solution of potassium bichromate. By keeping the cloth thus immersed it become deep black. Then wash the cloth with clean water and allow it to dry in air.

N.B.:—Gum mucilage may be prepared by dissolving 2 parts gum arabic or gum tragacanth in 1 part water.

II

Aniline salt	8	tolas.
Sodium chlorate	4	,,
Copper sulphate	2	,,
Copper chloride	1¼	,,
Gum mucilage	68	,,

Proceed as above.

WHITE-DISCHARGE PRINTING WITH ANILINE BLACK

1. Aniline salt 3 tolas.
   Water 8 ,,
   Dissolve.
2. Potassium Ferrocyanide 1 tola.
   Water 4 tolas.
   Dissolve.
3. Potassium chlorate 2 tolas.
   Water 8 ,,
   Dissolve.

Mix 1, 2 and 3 in a vessel and immerse the cloth in this cold mixture. Keep it for half an hour and then squeeze out the water and dry the cloth in the air. After drying print the cloth with the following composition:—

Soda Carbonate	2	tolas.
Gum mucilage	7½	,,

Mix into a paste form.

Again dry the cloth and then fix the print by either holding it over steam for a minute or keep it hanging in the air for 12 hours. Then immerse the cloth in a solution of potassium bichromate for a few minutes and wash well with water and dry in air.

TURKEY RED PRINTING

Alizarine	2	tolas.
Aluminium acetate	1	tola.
Calcium acetate	½	,,
Olive oil	½	,,
Gum mucilage	6	tolas.

Make the printing paste with above ingredients and then print the cloth with it. Hang up the cloth in the air and keep it in that state until the red colour is well developed. Then fix the colour by steaming for a few minutes.

TURKEY RED WHITE-DISCHARGE PRINTING

In making while discharge the cloth having dyed with turkey red colours is again printed with following solution and dry.

Citric Acid 4 tolas.
Oxalic Acid ½ tola.
Gum Arabic Mucilage 18 tolas.

After drying treat the well stretched cloth in a bleaching powder solution of 12°Tw. for 3 or 4 minutes when the printed parts will be turned white.

TURKEY RED YELLOW-DISCHARGE PRINTING

The cloth dyeing with turkey red colours may be printed with the following solution:—

Lead nitrate	1	tola.
Tartaric acid	1	„
Citric acid	2	tolas.
Gum mucilage	3	„

After printing the cloth with the above paste dry it in air. Then treat the well stretched cloth in solution of bleaching powder, 12°Tw. for 1 minute when the printed parts will be discharged. After this wash the cloth well and again treat the cloth for 1 minute in a solution of potassium bichromate of 2°Tw. when the white patches will be turned yellow. In the end wash the cloth with clean water.

NAPHTHOL WHITE-DISCHARGE PRINTING

Mix thoroughly 13 tolas of kaolin in 12 tolas of hot water; then add 2 tolas of sodium carbonate. Next stir in 50 tolas of gum arabic mucilage and along with it intimately mix 20 tolas of rangalite C powdered. After this mix anthraquenone paste. It is better to keep aside the mixed paste 2 to 3 hours before use because rangalite C takes much time to dissolve.

Naphthol dyed cloth should be dried without washing and then print the cloth so dyed as soon as possible. After printing it should be dried without delay. When dry hold the cloth over steam for half an hour. Lastly boil the cloth for 15 minutes in a solution of soda ash and soap, next wash and dry.

TURKEY RED YELLOW-DISCHARGE PRINTING

In this type of printing the naphthol dyed cloth without washing may be dried in air. Then for yellow-discharge it may be printed in the following manner:—

Rangalite C	7	tolas
Soda ash	3	„
Gum mucilage	90	„
Anthraquenone paste	1½	„

Mix thoroughly and print the cloth with a hand block. After printing dry the cloth as soon as possible. When dry, steam the cloth for 15 minutes. Lastly boil the cloth for 15 minutes in a solution of soda and soap. Finally wash and dry

NAPHTHOL-RED GREEN-DISCHARGE PRINTING

In producing green-discharges over the cloth the naphthol dyed fabric should be dried without washing and then print with the following composition:—

Rangalite C	7	tolas.
Soda ash	3	„
Gum mucilage	90	„
Brilliant indigo 4 B Paste	2	„
Anthraquenone paste	2	„

Other procedure is the same as before.

INDIGO WHITE-DISCHARGE PRINTING

First dye the cloth with indigo dyestuff in the usual manner. Then print it with the following paste and dry in air:—

Potassim bichromate	3	tolas.
Caustic soda	¾	tola.
Olive oil or Turpentine	1	„
Gum mucilage	15	tolas.

Mix and print.

In the meantime warm the following solution to 60°C.:—

Sulphuric acid	10	tolas.
Oxalic acid	4	„
Water	146	„

By dipping the printed cloth in this solution warmed to 60°C for half a minute or one minute the printed parts of the cloth will turn into white. Then wash the cloth thoroughly and dry.

RESERVED PRINTING

In reserved printing the cloth should be treated in a solution of tannic acid. After drying, it may be printed thus:—

Gum mucilage	10	tolas.
Caustic soda	5	,,
Kaolin	5	,,

After drying steam the cloth for 2 or 3 minutes. Then dip it in a solution of tartar emetic. Next squeeze out and dye the cloth in any basic dyestuff when the printed portions of the block will remain white.

RAPID PRINTING

At the present time there is in the market a variety of printed cloth of fanciful colours. The shades of these cloths are fast to washing. The method of printing is not at all difficult. Many types of rapid printing pastes may be prepared with these special dyes. The cloth printed with any of these pastes may be thoroughly dried. After 24 hours prepare a solution of sulphuric acid by mixing 3 oz. of sulphuric acid in 1 gallon of water. Warm this solution and immerse the cloth in it for a minute and at once wash in clean water. Then boil for some time the washed cloth in soap solution and again wash with cold water.

LIST OF RAPID COLOURS

Rapid fast yellow 2 G.H.; Rapid fast orange R.H.; Rapid fast orange R.G.; Rapid fast scarlet I.L.H.; Rapid fast red G.Z.H.; Rapid fast red R.H.; Rapid fast red G.L.; Rapid fast red B.B.; Rapid fast bordeaux B (Chocolate); Rapid fast bordeaux R.H. (Chocolate); Rapid fast green 321; Rapid fast blue B; Rapid fast brown G.G.H.; and Rapid Fast brown I.B.H.

(A) The composition of the printing paste of any of these dyes is the same (Rapid fast bordeaux R.H.; Rapid brown I.B.H.; Rapid fast brown G.G.H.; Rapid fast red R.H.: Rapid fast red G.Z.H.; Rapid fast scarlet I.L.H. and Rapid fast orange R.H.).

Rapid Dyestuff	5	parts.
Caustic soda solution 1:2	2	,,
Monopole Soap Solution 1:2	10	,,
Hot Water (50°C)	15	,,
Neutral Gum Solution	68	,,

(B) The composition of printing paste of rapid fast red G.L. and Rapid fast orange R.G. may be as follows:—

Rapid dye	5	parts.
Caustic soda lye 1:2	2	,,
Monopole soap solution 1:2	10	,,
Cold water	15	,,
Neutral gum solution	68	,,

(C) The printing paste of Rapid fast yellow 2 G.H. may be prepared thus:—

Rapid fast yellow 2 G.H.	10	parts.
Caustic soda lye 1:2	3	,,
Neutral chromate solution	5	,,
Hot water (50°C)	10	,,
Neutral gum solution	72	,,

(D) The printing paste of Rapid fast green 321 may be prepared as follows:—

Rapid fast green 321	10	parts.
Caustic soda solution 1:2	3	,,
Monopole soap solution 1:2	3	,,
Hot water (50°C)	15	,,
Neutral gum solution	69	,,

(E) The preparation of printing paste with Rapid fast red B.B. as follows and Rapid fast bordeaux B.

Rapid dye	10	parts.
Monopole soap solution 1:2	10	„
Caustic soda solution 1:2	2	„
Neutral gum solution	78	„

(F) The preparation of printing paste with Rapid fast blue B is as follows:—

Rapid fast blue B	5	parts.
Caustic soda solution 1:2	2	„
Monopole soap solution 1:2	10	„
Neutral chromate solution	10	„
Neutral gum solution	63	„

Notes:—

The following notes may be carefully gone through while preparing the above printing pastes:—

NEUTRAL GUM SOLUTION

Gum mucilage	1000	parts.
Caustic soda solution 1:2	20	„

Mix.

NEUTRAL CHROMATE SOLUTION

Sodium bichromate	150	parts.
Water	830	„
Caustic soda flake	20	„

Mix.

CAUSTIC SODA SOLUTION

Caustic soda flake	1	part.
Water	2	parts.

Mix.

MONOPOLE SOAP SOLUTION

Monopole soap	1	part.
Water	2	parts.

Mix.

INDIGOSAL PRINTING ON COTTON AND ARTIFICIAL SILK

This type of printing is to be considered a branch of rapid printing and is mainly used in printing cotton, silk and art silk. The method and procedure of printing is the same as rapid printing. The only difference is that the printing paste is prepared with different chemicals and dyes. The following is a list of Indigosal colours:—

Indigosal Golden Yellow I.G.K.: Indigosal Yellow H.C.G.: Indigosal Violet A.Z.B.; I.B.B.F.; Indigosal Black I.B.; Indigosal Blue I.G.G.: Indigosal Scarlet H.B., I.B.; Indigosal Brown I.R.R.D.; Indigosal 04B (Blue); and Indigosal Green I.B.A.

(A) Of these the printing paste of the first seven dyes may be used for printing cotton and artificial slik and can be prepared as follows:—

Indigosal dye	5	parts.
Glyecine A	5	„
Boiling water	17	„
Neutral gum solution	70	„
Sodium nitrite	3	„

(B) Indigosal Green I.B.A. printing paste is prepared as follows:—

Indigosal Green I.B.H.	10	parts.
Glyecine A	5	„
Boiling water	15	„
Neutral gum solution after cooling	64	„
Sodium nitrite	6	„

(C) Rapid and Indigosal mixed green colour is prepared as follows:—

1. | | | |
   |---|---|---|
   | Rapid fast yellow 2 G.H. | 8 | parts. |
   | Caustic soda solution 1:2 | 2 | „ |
   | Hot water (50°C) | 20 | „ |
   | Neutral gum solution | 45 | „ |

   Mix.

2. | | | |
   |---|---|---|
   | Indigosal 04B | 2 | parts. |
   | Boiling water | 20 | „ |

Mix. After this mix 1 and 2 and allow to cool. When cold add 3 parts of sodium nitrite.

INDIGOSAL PRINTING ON SILK

Indigosal Dyestuff	10	parts.
Glyecine A	3	„

Boiling water	20	parts.
Neutral gum solution	60	„
Ammonium sulphocyanide	3	parts.
Chlorate of soda solution	4	„

Mix. Now print the silk with this solution, dry and treat for half an hour with steam. Then immerse for a minute or two into the following tepid mixture:—

Sulphuric acid	5	parts.
Nitrite of soda	5	„
Water	1000	„

After this take out the fabric and wash with water, then soap and wash again and finally dry in air.

SILK PRINTING WITH DIRECT COLOURS

Direct dyestuff	7½	tolas.
Sodium sulphate	4	„
Water	25	„
Tartaric acid	2	„
Gum solution	46	„

Mix thoroughly. Then print and pass steam.

SILK PRINTING WITH BASIC COLOURS

Basic dye	2	tolas.
Water	23	„
Acetic acid 9°Tw	8	„
Glycerin	2	„
Gum solution	42	„
Tartaric acid	2	„

Mix the ingredients together and then warm it. Set aside to cool. When cold add 4 tolas of water and 8 tolas acetic acid. After mixing the whole print the silk fabric, dry and steam.

SILK PRINTING WITH ACID COLOURS

Acid dye	2	tolas.
Water	25	„
Glycerin	2	tolas.
Gum solution	44	„

Mix the ingredients together and warm for a few minutes. Then cool and mix water 8 tolas and tartaric acid 2 tolas. Next print the silk cloth with this, dry and steam.

ACID COLOUR DISCHARGE PRINTING ON SILK

First dye the silk fabric with acid dyestuff as usual and then dry. Next print the cloth with the following:—

Rongalite C	200	parts.
Gum solution 1:1	200	„
Water	100	„

FINISHING OF DYED AND PRINTED TEXTILES

Dissolve Ramasit I, 1 lb. and Dgepou T, 4 oz. in hot water 20 gallons. In finishing silk mix into this solution 4 oz. of citric acid. Then spray the solution over the cloth so as to make the cloth somewhat moist. Instead of spraying dip the cloth into this solution for a minute and take out. The moist cloth is next rolled up tightly over a wooden roller divided longitudinally into two sections just as the shawl washers use. After rolling the cloth fix two wedges of wood at its two ends so as to elongate the cloth as far as possible. On keeping in this manner for sometime take out the cloth from the roller and iron it whereby the cloth will be soft and glossy.

N.B.—All the recipes of this article have been translated from the Bengali book "Taunt & Rong" (Weaving & Dyeing) by Sri Trailokhya Nath Basu, Associate of Government Weaving Institute Serampore, Bengal.

—THE ART OF PYROTECHNICS

PYROTECHNY is the art of making fireworks. It plays a very important part at the time of Dipali. Although formerly applied to the smelting and roasting of metallic ores, and to other metallurgical processes involving the use of fire, the term pyrotechny has become narrowed down in modern times so as to include only those effects of fire that are produced mainly for scenic displays. That mixtures of certain substances, some of them more or less familiar, when ignited were capable of producing brilliant and startling effects was known to the early ancients.

Pyrotechny is said to have had its origin in the East, firework displays being well-known in China for many centuries prior to their introduction into Western countries, and even to this day the Chinese and Japanese excel in the production of certain fireworks of great beauty.

Pyrotechny is essentially a "handicraft", that is to say, it is one of the very few remaining arts which is still carried on entirely by hand, and which has not been invaded and revolutionised by the introduction of modern machinery. Notwithstanding the great variety of effects produced by the many different kinds of fireworks, they all have certain fundamental essentials in common. All fireworks contain a combustible substance, and a supporter of combustion. The combustible, or the fuel, may be either one or more of a great variety of materials, such as carbon, sulphur, resin, shellac, sugar, starch, pitch, licopodium, various picrates, various sulphides and various metals, as iron, antimony, copper, magnesium and aluminium.

The supporters of combustion are mainly certain oxygen salts, such as chlorates, and nitrates, which are readily able to give up their supply of oxygen, to the combustible bodies. The pyrotechnist rarely supplies the fuel with a sufficient amount of the oxygen salt to bring about the complete combustion of the former. The object of the firework-maker is not to discharge into the air the completely oxidised products of combustion, but rather to throw out a certain amount of material which is in a condition to enter active combination with the oxygen of the air and to carry on its combustion at the expense of this outside supply of oxygen.

The exact nature of the chemical changes which accompany the burning of a firework are little known. The various mixtures, therefore, which are used to produce certain results have in most cases, been arrived at, not by processes of scientific reasoning, but by purely empirical rules. Although the art of pyrotechny is regarded as a chemical one, it embraces many mechanical considerations and details which are of no less importance to the production of scenic displays than those which are more distinctly chemical.

RAW MATERIALS

Raw materials employed in the manufacture of fireworks are too many to mention here in the limited spaces at our disposal. The following are some of the most important materials that come into the composition of important fireworks: Potassium nitrate (double refined), potassium chlorate, potassium perchlorate (less dangerous than chlorate) sulphur, charcoal from soft wood, shellac, strontium nitrate, barium nitrate, sodium oxalate, copper ursenite (Paris green), copper sulphate, antimony, antimony sulphuret (black), red arsenic, aluminium powder steel filings, ammonium

chloride, dextrine, gum arabic, clay, gun powder, meal powder, etc.

STAGES OF MANUFACTURE

The subject of pyrotechny may be subdivided into four or more stages namely——

1. Preparation of mixtures.
2. Manufacture of cases.
3. Loading of cases.
4. Various accessories, as quick-match, touch paper, haders, port fins, etc.

PREPARATION OF MIXTURES

The mixtures used in pyrotechny are called compositions, and their preparation requires some care. In this branch of the work a knowledge of chemistry is of the greatest importance to the pyrotechnist, in order that he may not only get the best results out of his materials, but also that he may avoid the dangers which attend the use of highly explosive combinations he has to handle. Many mixtures are also liable to undergo chemical decomposition, so that they can only be employed when the firework is to be used within a short time of its manufacture. Other mixtures are liable to move rapid spontaneous decomposition resulting in the ignition and explosion of the materials.

The staple materials employed in a great number of mixtures or compositions are saltpetre, sulphur, charcoal and meal powder. The addition of either saltpetre to a composition, or fuse as it is generally called, has the effect of making it quicker, whilst the addition of sulphur slackens it; e.g. quick match made from meal powder 6 parts, sulphur 1 part burns with the greatest violence; whilst that made from meal 1 part, sulphur 1 part will scarcely burn at all.

MANUFACTURE OF CASES

All cases are generally made of paper and the choice of the paper is a point of some importance. The paper varies in quality and stoutness, according to the particular kind of the firework to be made and to the amount of strain which will be put upon the case. In some instances the material of the paper influences the character of the display produced by a particular firework. Most of the papers employed are of a superior quality, as it is found that greater strength can be obtained by the use of a smaller quantity of good paper than by employing more of one of inferior quality paper which is loaded of adulterated cannot be used. The majority of cases are made of brown paper, although some, and more especially the smaller sorts, as crackers, rotating, etc. are always made of white cartridge.

Owing to the great variety in size required, the cases are all made by hand. The tools employed are of the very simplest description, consisting of a wooden or metal roller called the "former" and a short of wooden board with a handle on one side, known as the "rolling board". For the larger cases the paper is pasted over its whole surface, and rolled round the former, the operation being done on a narrow slate table. The rolling board is then passed rapidly over it a few times with a firm steady pressure. The former is then withdrawn, and the case stood on end until it is so far dry that it can be laid on its side without risk of its losing its cylindrical shape. It is then stacked in a bin in a chamber through which a current of hot air is circulating, in order to render it perfectly dry. In many fireworks the cases have to be partially closed. or constricted near to one end. This is technically known as "choking". It may be effected in two ways, either by compressing the walls of the case to the desired extent, or by partially filling the mouth of the case with clay. When the first of these plans is adopted, the opera-

tion is performed when the case is freshly made, and only partially dry. For small fireworks it is done by means of a hand lever, made of two blades of steel, and screwed to the edge of the table. For larger cases a foot lever is employed.

When the construction is effected by means of a clay plug, the operation is performed at the time of loading.

For small cases the paper is pasted only along the edges, the former, in this case a thick metal wire, is placed nearly in the middle of the paper. One end is then folded over nearly to the other, and the double paper rolled over the former.

The cases may be closed at one end by folding the paper in upon the end of the former. These cases require no special drying chamber.

Besides cylindrical cases, there are cases made in the form of a sphere, known as "shells". These shells, which are constructed of various sizes, upto even 24 inches in diameter, are made by a process technically known as the "wet-stroke" process. Brown paper of a specially good quality is thoroughly pasted on both sides; strips are then torn from the pasted length, and laid upon the inside of a hemispherical bowl or mould, the strips radiating upwards from the centre to the circumference; the ends lapping over the edge of the mould; the workman continues this process until the desired thickness of paper is obtained. It is then removed from the mould and allowed to dry. These hemispheres are then placed in a lathe, and the rugged edges or rims carefully turned off. Two of these hemispheres are securely glued together to form the complete shell. These shells are destined to carry coloured stars and to be fired from a mortar; the mould in which they are made has therefore a slightly raised ridge running part of the way down. From the circumference, and producing a corresponding indentation or "dimple" in the shell, which allows of room between the shell and the side of the mortar for communicating the fire to the propelling charge below.

LOADING OF CASES

The loading operation varies in details according to the special firework to be filled, but, broadly speaking, it may be divided into two sections, viz., loose-filling and ramming. The apparatus employed in the first of these methods is a metal funnel of an elongated shape, and a wire, the operation being known as "wire and funnel" filling. The wire is usually square, and of such a thickness that it will just pass through the end of the funnel. The case to be filled, if a choked case, is placed upon a stand with its choked end fitted upon a nipple fixed for its reception; the stem of the funnel is then inserted into the open end of the case, and by drawing the wire quickly up and down the composition is pushed down uniformly into the case. When full to the required height the case is closed up. With small fireworks (such as squibs, etc.) this is done by firmly squeezing the end of the case with a tool known as the "closing in" machine, and finally dipping the end into a composition made up of glue and red lead commonly called "dip".

Long narrow cases are filled without the use of a stand. For wheels no special tools are required, the long narrow tube being wound by hand upon a small wooden disc, and secured by strips of tape or paper glued across. In the manufacture of crackers two special pieces of apparatus are required. The first is a rolling or flattening machine. The filled cases are passed between the rollers of this tool, and thereby squeezed flat, the pressure being carefully regulated to the

required degree. The other tool is the bending machine. The cans are bent backward and forward over steel wires about the thickness of a stout steel knitting-needle, until the requisite number of bends is obtained; they are then pressed firmly down with a piece of wood, and removed from the machine. The bent case are then tied up into the familiar compact form with a suitable thread, and the ends primed in the usual way with touch-paper.

Of the second method of loading cases the composition is rammed in, viz. the Roman candle, in which the mixture is gently rammed, and the rocket, in which it is malleted. The case of a Roman candle is a straight or unchoked one. It is placed upon a block and the projecting core exactly fits into the case.

A small quantity of finely-powdered and sifted clay is first introduced, and tightly driven down by means of the rammer, a wooden rod which loosely fits in the case. By pressure the clay sets to a stiff solid mass. The case is next to be filled with the composition, and coloured stars, alternating. Each layer of mixture is introduced in two quantities, and rammed down. Care is taken to regulate the charge of mixture, so that each star shall be blown out to the same distance.

Rockets are loaded by the mixture being forcibly rammed into the case by a mallet, and as this firework is in some respects of a special construction a brief description is given at the proper place to make it understandable.

MEAL POWDER

Mount a 50 gallon wood barrel on two uprights so that it will revolve freely on centres fastened to the heads. On one center attack a crank and cut a hole (close by a suitable plug) into side of barrel for putting in and removing the necessary ingredients. Place in the barrel 300 to 500 lead shots or balls about one inch in diameter. When it is desired to make meal powder, put into the barrel a thoroughly mixed composition as follows:—

Saltpetre	15 lbs.
Charcoal	3 „
Sulphur, flour	2 „

Put the ingredients into the barrel and revolve it for about 500 turns, when the mixing may be complete. But more revolutions of the barrel may produce stronger powder. Great care must be exercised to see that no foreign matter such as nails, gravel, etc. find their way into the barrel as this might result in an explosion.

ROCKETS

Rockets are perhaps the most popular article of the pyrotechnical craft. So much has been written about sky rockets that any general description would be superfluous. Suffice to say that rocket consists of a tube of paper, rammed with suitable composition, its lower end choked to about ⅓rd. the diameter of its bore and a hollow centre extending upward through the composition to about ¾ inch of the top. A stick attached to the tube serves to balance it while ascending.

Broadly the composition of a rocket, that is the portion of it which burns while it is ascending, should be seven times its diameter, in length. Six-sevenths is pierced through the centre while one-seventh is solid and acts as the fuse to communicate the fire to the heading when rocket reaches the highest point of its flight. The tube is made of good strong paper, preferably three turns of hardware on the inside with four or more turns of good strawboard.

The body is of paper tube constricted at the lower end either by squeezing and then tying with a ligature, or by means

of a clay plug. In order to fill the body a conical mould is inserted through the constricted end, point upwards, and the propellant charge then added little by little and well malleted home. There is considerable skill required in doing this, as the packing must be quite even if good results are to be obtained. When the propellant has been added the top is closed with a perforated clay plug through which a piece of quick match (touch paper) passes in order to fire the head, and the conical mould then withdrawn. The head is another paper case containing a burster charge of gun powder and garniture in the form of stars, floating stars, or whistling fireworks, and is glued on to the body. The stick is then attached so that the rocket balances when supported about one inch from the base. It is fired by applying fire to the conical hole left in the base by the mould. The outrush of gases causes the rocket to ascend, and when at its maximum height the quick match causes the burster charge to explode, thus liberating the garniture.

COMPOSITION

The following are good compositions for rockets of different sizes:—

	1 to 3 oz.	4 to 8 oz.	1 to 3 lbs.	4 to 8 lbs.
Saltpetre	18	16	16	18
Mixed coal	10	9	12	12
Sulphur	3	4	3	3

If on trial rockets burst add more coal; if they ascend too slowly add more saltpetre.

TOUCH PAPER

Touch paper is much used for igniting fireworks, and is made by brushing paper, usually blue in colour, on one side with a solution of nitre (half a pound to the gallon) and then drying. Slow match for pyrotechnic purposes is made by soaking blotting paper in lead nitrate solution (2½ lbs. per gallon) and, after drying, pasting the sheets together, usually so as to give six thicknesses. Pyrotechnic quick match, on the other hand, is made by impregnating lamp wick cotton with a smooth cream of hot starch solution and meal powder, and then dusting it over with dry powder.

STARS

Stars are very similar in nature, but are contained in a rocket or shell, and only liberated and ignited when the rocket or shell has reached its maximum height. They consist of fiercely burning mixture containing chemicals to impart colour to the flame. We now show how stars are made.

These require considerable care in preparations, success depending upon the uniform fineness, the intimate union, and the dryness of the ingredients.

There are two types of stars, namely "naked" and "pill box" stars. The former is composed of a mixture of charcoal, sulphur, meal powder, and a nitrate of a metal to impart the desired colour, the ingredients being mixed together with shellac, and then either moulded into pellets or spread out and cut up into cubes, after which the solvent is dried off and the stars loaded direct into the rocket. These stars should only be employed in fireworks of the smallest sizes, as they are very apt to crumble. In any case to avoid crumbling it is very important to use shellac or other binding material which is completely soluble in the solvent used, usually methylated spirit. As a rule no special device is used for igniting naked stars, ignition being brought about by the burster charge and for this reason they are almost invariably composed of nitrate mixture and not chlorate mixture. In any case a naked chlorate star in contact with meal powder cannot be used as it would mean having a chlorate in contact with sulphur.

Coloured rocket stars are also made by driving the coloured composition, slightly moistened with gum water into small cases which go under the name of pill-box cases. These are known as pill-box stars and are much safer than naked star. If the star is to consist of one colour only, these pill-boxes are open at both ends, and a piece of quick match is placed between the composition and the inside of the pill box and allowed to project about half an inch beyond each part of it. When fired these stars burn at both ends at the same time, and so produce a great amount of smoke in proportion to their size.

If it is required to make stars consisting of more than one colour, the pill-boxes are left open at one end only. The composition is thus prevented from burning at more than one of its surfaces at a time. These stars generally contain two colours; the pill-boxes are half-filled with one-coloured composition and the remaining space is filled with the other composition.

Red

Potassium chlorate	47	parts.
Sugar	21	,,
Strontium carbonate	22	,,

Blue

Potassium chlorate	80	parts.
Sugar	50	,,
Cuprous sulphide	30	,,
Mercurious chloride	40	,,

Green

Potassium chlorate	13	parts.
Sugar	11	,,
Barium nitrate	15	,,
Mercurious chloride	11	,,

Yellow

Potassium chlorate	59	parts.
Sodium oxalate	17	,,
Shellac	24	,,

Magnesium or aluminium powder is also sometimes added in the above in order to increase the brilliancy.

ROMAN CANDLES

These are probably the most popular piece of fireworks made. To make this type of candles by hand, roll the paper cases as described under the general process. Then make some candle composition as follows.

Powder saltpetre	1.8	lbs.
Charcoal powder	1.1	,,
Sulphur powder	9.5	,,
Dextrine	1.6	,,
Water	16	fl. oz.

Mix all the solid ingredients and sift three times. Then add water and mix again until the whole lot is evenly dampened. Then force through a 16 mesh sieve into cloth bottomed trays and dry in the sun.

Now place vertically an empty case and pour in a scoop of clay and ram it firmly with a light mallet. Remove rammer, pour in a scoop of gun powder on top of which drop a star and lastly, a scoop of candle composition. Ram with about six blows of a light mallet. Remove rammer and pour in another scoop of gun powder; another star and another scoop of candle composition, repeating this until case is filled to within 2 inches of the top. Remove candle and finish.

GERBES OR TUBRI

Electric Tubri

In preparing this sort of gerbe the ingredients are generally of a quite different category. Instead of nitre, charcoal and sulphur which are used in making ordinary gerbes, use is made in this case simply of shellac of fine grade and chlorate of potash. For attaining success in manufacture it is desirable that the shellac should be reduced to powder and finally passed through a fine cloth. Precautions should however be taken that the ingredients do not come in contact with other substances particularly sulphur, otherwise

due to explosion dangerous consequences may follow:—

A couple of typical recipes follow:—

I

Chlorate of potash	16	parts.
Shelac	6	,,
Magnesium powder	8	,,

II

Chlorate of potash	16	parts.
Shellac	4	,,
Aluminium powder	10	,,

FLYING TUBRI

This should be prepared as fresh as possible. Otherwise, sugar being in contact with chlorate of potash for a good length of time is liable to get oxidised with the result that the Tubri is likely to burst and may not ascend to a great height. Grind each ingredient separately and sift through a fine cloth and then weigh out and mix.

ORDINARY

Chlorate of potash	10	parts.
Refined sugar	4	,,

RED

Chlorate of potash	10	parts.
Refined sugar	4	,,
Strontium nitrate	1	part.

BLUE

Chlorate of potash	10	parts.
Refined sugar	4	,,
Copper sulphate	1	part.

GREEN

Chlorate of potash	10	parts.
Refined sugar	4	,,
Barium nitrate	1	part.

YELLOW

Chlorate of potash	10	parts.
Refined sugar	4	,,
Soda ash	1	part.

The ingredients are powdered separately, sifted, mixed thoroughly and then charged into tiny clay moulds.

ELECTRIC SPARKLERS

Fine steel filings	12	parts.
Fine aluminium powder	1	part.
Potassium perchlorate	6	parts.
Dextrin or gum arabic	2	,,
Water to suit.		

The steel must be protected from corrosion with paraffin. The gum should be made of the consistency of mucilage. Mix the ingredients thoroughly and add gum solution until a mixture is obtained that will adhere to the wires when they are dipped into it. This varies in different sections and with different runs of ingredients. In practice, bunches of wire are dipped at once and slowly withdrawn in a current of warm, dry air which causes the mixture to adhere evenly.

MAGIC SERPENT (White)

I

Fuse in a crucible equal parts by weight of yellow prussiate of potash and flowers of sulphur; it is advisable when the heat cannot be well regulated to include a little carbonate of potash. Lixiviate the mass with water, and filter; the filtrate will be sulphocyanide of potassium, which, upon being added to a solution of mercury, dissloved in nitric acid, gives a copious precipitate of sulphocyanide of mercury. Collect this, wash well with water, and dry; roll it out and cut into pieces of desired sizes and dry.

II

The remarkable substance consists of small pellets of sulphocyanide of mercury which has the remarkable property of swelling 25 to 50 times its original size when lighted, producing a long snake like ash. To prepare, make a concentrated solution of mercuric chloride and add little by little a solution of potassium sulphocyanide, stirring constantly. A greyish precipitate will be formed and when the last drop of sulphocyanide added no longer produces cloudiness permit

the mixture to settle. Drain off as much as possible of the clear supernant liquid, remove precipitate to a paper filter placed in a glass funnel and wash slightly. When thoroughly dry reduce to a fine powder. When ready to form the eggs moisten very sparingly with a week solution of gum arabic to which may be added a pinch of saltpeter and form into cones.

MAGIC SERPENT (BLACK)

Naphtha pitch	10	parts.
Linseed oil	2	,,
Fuming Nitric acid	7	,,
Picric acid	3½	,,

Reduce pitch to fine powder; add linseed oil and rub in well; add the fuming nitric acid, little at a time. Allow to cool for one hour. Wash several times with water, the last time allowing the mass to stand in the water for several hours. Thoroughly dry; powder fine and add picric acid, rubbing it in well. Moisten with gum arabic water and form into pellets.

COLOURED FIRE STICKS

These consist of thin wooden sticks similar to applicators used by physicians for applying iodine etc. to affected parts. They are dipped for half their length into coloured fire composition in a more or less liquid state.

One method is to melt one part of gum shellac in an iron pot. Stir in five parts of very finely powdered strontium nitrate. To keep this sufficiently liquid it must be kept quite hot by the use of a steam kettle. This is for red sticks. Another method is to dissolve the shellac in alcohol and adding the strontium. The proper consistency of the mixture can be easily regulated by using more or less alcohol as required. When the sticks are dried they are ready for use.

Green is not so successfully made, barium nitrate being substituted for strontium. A little lampblack improves the burning but detracts from the colour, especially the green. The sticks are pushed into a groove in the bar.

RUBY AND EMERALD SHOWER STICKS

These are much more effective and are made in the same manner as above, using following composition:—

Strontium nitrate	6	parts.
Coarse aluminium powder	6	,,
Potash perchlorate	2	,,
Shellac	1	part.

Dissolve shellac in alcohol and add other ingredients, previously well mixed. Stir thoroughly to consistency of thick glue and dip sticks previously arranged in holder so that they may be placed in drying rack.

For Green use:—

Aluminium powder coarse	6	parts.
Barium chlorate	4	,,
Shellac	¾	part.
Alcohol		q.s.

The Japanese make a similar article of twisted paper but this requires a great deal of practice to learn.

POT-POTIA

This is a very amusing piece of fireworks. When scratched on the pavement it gives off a continuous series of little explosions.

Mix 5 kilograms of powdered gum arabic with 5 litres of water, adding water gradually with constant stirring. Then add 1½ kilograms of magnesium carbonate. Place this on a water bath with a thermometer arranged so that the temperature can be carefully observed and heat to 50°C after which add a mixture of 1 kilogram of white phosphorus and stir until entirely melted. Continue stir-

ing while cooling to 45°C after which add a mixture of 2½ kilograms red ochre and 3 kilograms potassium chlorate and stir cautiously until a perfectly smooth product results after which it may be poured in paper moulds in the manner described below.

Secure a number of boards of ⅞" material and bore holes into them ¼" deep and 1¼" diameter. Turn up a puncher which will work easily in the holes. Cut some red tissue paper of good quality into circular pieces 2½" diameter. Lay them over the holes in board and punch in. Pour into these the composition and fold over the edges of the paper. Allow to set and when hardened they may be removed and thoroughly dried when they will be ready for use. In preparing this firework great care must be used to prevent accidents as the mixture containing phosphorus and potassium chlorate.

CHINESE FIRE CRACKERS

The following formulas are used for making the composition used in Chinese crackers.

	I	II
	Parts.	Parts.
Saltpetre	50	45
Sulphur	25	18
Charcoal	25	25
Potassim chlorate	—	8
Sand	—	4

FUSE

This is a very difficult part of making crackers. Very tender and skilled fingers are required to produce this insignificant looking yet most requisite adjunct. A thin strip of tissue paper, about ¾" wide and 14" long is laid on a smooth damp board; a little stream of powder is poured down its centre from a hollow bamboo stick and with the tips of soft skimmed fingers which seem to have an attraction for the paper and placed against the right hand lower corner, a rolling motion in the general direction of the upper left hand corner causes the paper to roll up into a twine like fuse. The slightest touch of paste secures the end and prevents unrolling. When dry it is cut into the required lengths and is ready for use.

WHISTLING FIREWORKS

The peculiar property of potassium picrate to whistle while burning has been known for a long time and has been made use of for producing the amusing whistling fireworks. To make this article dissolve 1 lb. picric acid in the least possible quantity of boiling water, in a procelain receptacle; add ¼ lb. potassium carbonate, little by little, stirring continuously. Then add 1 lb. powdered saltpeter. Stir thoroughly; allow to stand for one hour and remove to a heavy piece of filter paper placed in a glass funnel where it can drain. When dry crush to fine powder with a wooden roller. Very small quantities should be handled at a time as an explosion will cause disastrous results. The dry powder may be rammed into tubes from ¼" to ¾" diameter and will produce the whistling sound when burned. Bamboo tubes are most effective.

Owing to the ease with which potass: picrate detonates whistles cannot be used in shells but small tubes ¼" diameter and 2½" long when charged with the above composition may be placed in the heads of rockets or fastened to the outside and arranged to burn as the rocket is ascending. Attached to wheels they are quite amusing, but the most effective use for them is when a series of six or eight ranging in size from ¼" to ¾" diameter are set side by side like a Pandaen Pipe and burned simultaneously.

PYROTECHNIC MATCHES

Next to sparklers pyrotechnic matches form safe and pleasing fireworks for children. The following is a brief description of the process of its manufacture.

SPLINTS

Splints used for the manufacture of the Bengal lights are made broader and flater, and not square as those of safety matches. But they are equal in length and thickness to the ordinary match splints. The flat sides of the splints permit of holding more composition and spreading of same on the flat sides to give a bigger flame at the expense of the minimum quantity of wood. The flat splints are manufactured by increasing the feed of the pile of veneers in the splint chopping machine on interchanging the ratchet wheel and varying the number of steps turned by the ratchet.

. The splints being flat, the frame building machine suitable for same slightly differs from that meant for safety matches in its construction to admit of same, but the working principle remains the same as before.

Paraffining is not required in the manufacture of Bengal lights. The application of the compositions require two separate dips in two different compositions, the first being allowed to dry thoroughly before the next one is applied.

The composition for the first dip is for producing the coloured light while that for the second dip is for the match head to fire the former. The coloured-light composition is applied about two-thirds of the length of the splint and the match head forms the tip. The essential components for producing the green colour consists of the salts of barium while those used for the red colour are compounds of strontium. These are mostly of very high co-efficient of deliquescence and consequently free use of glue as the binding agent is undesirable, as the absorption of moisture in quantity does not permit of retaining the different ingredients of the composition in adherence amongst themselves and with the splint. Shellac dissolved in methylated spirit makes sufficient agglutinant for the purpose and the use of some varnish keeps off the moisture effectively.

SPECIFIC RECIPES

The following are some typical examples of Bengal light compositions:—

RED LIGHTS.

	I.	II.	III.
1. Potassium chlorate	40	20	15
2. Strontium nitrate	120	20	25
3. Sulphur	20	5	13
4. Lamp black	4	1	1
5. Chalk		1	
6. Antimony trisulphide			4
7. Glue	6	2	2
8. Shellac	8	2	3
9. Copal Varnish	11	2	3

GREEN LIGHTS.

	I.	II.	III.
1. Potassium chlorate	32	70	200
2. Barium nitrate	160	300	250*
3. Sulphur	32	100	100
4. Lamp black	8	15	10
5. Barium chlorate		200	
6. Glue	7	20	13
7. Shellac	10	25	28
8. Copal varnish	5	10	8

PROCESS

The process of preparation of the composition:—

Take the glue and soak same in two to three times its weight of water and dissolve by boiling on water bath to a clean viscous fluid stirring all the time. Pass this through a sieve and weigh and note the loss in weight. Take hot water equal to this loss and wash the glue pot

and the sieve and washings into the strained solution.

Take shellac in a separate pot and keep it soaked for a few hours in double its weight of methylated spirit and keep it covered airtight as much as possible. Stir well when the shellac has gone into solution.

When the glue and shellac are thus dissolved and ready, mix the two solutions together. Shellac solution should be added gradually and not the whole quantity abruptly into the glue solution. Stirring must be done constantly while so mixing, and care should be taken to prevent thickening. Lastly add the copal varnish into this mixture of solutions and stir to a homogeneous consistency. Then add the dry chemicals and grind the whole batch well on a conical mill when the composition is ready for dipping.

On dipping into the composition they are dried in the air. It takes about 12 to 24 hours according to the humidity of the air. When thoroughly dried, they are again dipped into the safety match composition in the usual way. The match composition is generally coloured red by the addition of Eosine or Rhodamine in very small proportions to the same rendering them to form agreeable red tips. The match heads are then dried, the frames emptied and the matches are filled into boxes by twelve in each.

BENGAL FIRE

Bengal fire is the simplest form of firework, and simply consists of a moderately fiercely burning mixture containing suitable salts to impart colour to the flame, strontium and calcium being used to produce red, barium or copper for green, etc. Many different mixtures can be used, of which the following may be considered typical:—

RED	Parts.
Potassium chlorate	15
Strontium carbonate	15
Shellac	7
YELLOW	
Sodium nitrate	70
Sulphur	20
Antimony sulphide	7
Charcoal, powdered	3
GREEN	
Barium nitrate	66
Sugar	33
Shellac	1
BLUE	
Potassium chlorate	45
Charcoal, powdered	5
Copper carbonate	10
Mercurious chloride	35
Shellac	5

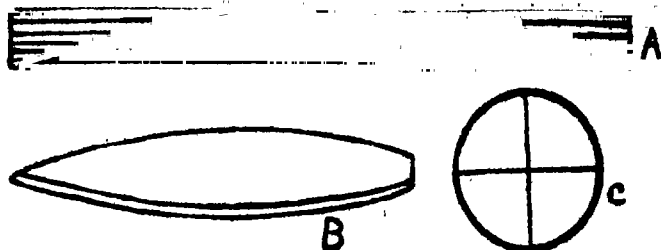
PAPER BALLOONS

Paper balloons also play very amusing part among the ascending fireworks. It is made with tissue papers in various shapes and sizes. Some carry a number of pyrotechnic materials in course of ascend and after attaining a height of several hundred feet above the ground ignite them scattering coloured stars, parachute, etc. over the surface giving amusement to all kinds of people.

In order to make a paper balloon proceed as follows:—

Secure some good tissue paper 20″×30″. Paste two sheets together on the 20″ ends making a sheet 20″×60″. Split this lengthwise and get a sheet 10″×60″. Make twelve sheets of this size; lay one on top of another and double over the lot longitudinally so as to have pile 5″×60″. Now, with a scissors cut along the unfolded edge as shown in Fig. (A) removing the part shown as shaded. The exact line to cut may be determined

by practice until the most satisfactory shape is found when an extra sheet of heavy paper should be cut and reserved as a pattern.

For a balloon of the above size the ring should be about 15" diameter. In balloons 10 feet or more in height a wire basket is sometimes woven into the centre of the

Unfold sheets cut as above and lay one on the table before you. On top of this lay another but about ½" nearer to you thus leaving an uncovered edge of the undersheet exposed (B). Apply paste lightly to this edge and lap it over into the upper sheet in this manner joining the two for their entire length. Make six pairs of sheets like this and then repeat the process with the double sheets. Join these as before making the final closing joint likewise. If the top of balloon where the joints meet is not well closed paste a small round piece of paper over all.

When balloon has dried make a ring of wire, bamboo or rattan for the bottom with cross wires to hold the inflator (C) ring so that an extra inflator may be added just before releasing balloon when ready to rise.

BALLOON INFLATORS

These are made in several ways. One consists of a ball of cotton wool which is saturated with spirit or kerosene oil when balloon is to be inflated. A more convenient inflator may be made by impregnating a ball with paraffin and fastening it on top of cross wires of balloon ring. This has the advantage of being cleaner and requires nothing further than lighting when balloon is to be raised.

DESIGNING BALLOONS

A balloon 5 ft. high when deflated can be made from 12 pieces of tissue paper cut out of sheets 10" wide and 60" long

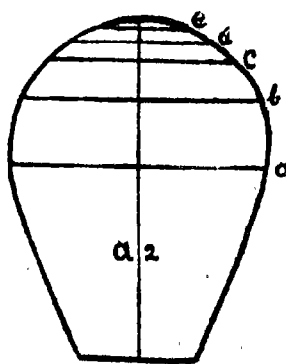
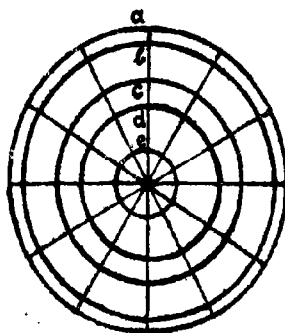
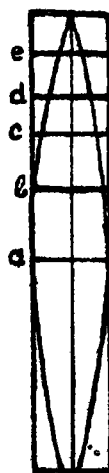



Fig. 1. Fig. 2. Fig. 3.

to get the proper shape for cutting these sections draw a plan of the desired shape of balloon when finished, somewhat as shown in Fig. 1. Then make a ground plan as shown in Fig. 2. Quarter the elevation plan by the two lines a 1 and a 2. The lines a 1 represent bottom at its widest point in both plans. Line b in ground plan is obtained by measuring the length of line b in Fig. 1 from central line a 2 to the edge of balloon and then taking the same distance from the centre of Fig. 2 and making a circle with a pair of compasses at this point. Lines c, d and e are obtained in the same manner.

Now, to make the pattern as shown in Fig. 3 draw a plan of one of the sheets from which the balloons is to be cut using same scale as in Figures 1 and 2. Divide it by a line through its centre lengthwise and then locate lines a 1, b 1, c 1, d 1 and e 1 by measuring distance from bottom of balloon to each cross line on Fig. 1 along one edge from d 2 to e. It now only remains to locate the points on Fig. 3 for getting proper shape of pattern. To do this take a pair of dividers and measure length on line b 1 from central perpendicular line in Fig. 2 to point where it intersects the next radial line to the right. Divide this distance equally to each side of central line of line b 1 in Fig. 3. Do the same with lines c, d and e. On a large plan this may be more accurately done with a flexible rule but when using dividers as above a slight allowance must be made for the curvature of the lines at Fig. 2. All that is necessary, now, is to draw an easy line from top to bottom of Fig. 3 as shown. The bottom of 5 ft. balloon should be about 15" diameter. Dividing this by four will give approximately 3¾" for bottom pattern.

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—GILDING OF METALS

THE deposition of gold attracted early attention, primarily from the known resistance of this metal to all types of corrosion, and also from its exceedingly pleasing appearance. While very small amounts of gold find application in the several cheap alloys used in many ordinary varieties of jewelleries, the still smaller quantity which by the several processes of deposition can be applied to do all that is necessary is surprising. If the nitric acid test is anything of a standard then it would appear that films of as little as one-millionth of an inch render good service.

Since pure gold is too soft for everyday use, it is frequently alloyed with other metals to impart hardness and improve its wearing qualities. Many so-called gold products are only surfaced with these alloys, the inner, base metal being of the copper zinc type, with colours approximately to that of gold alloy so as to become less prominent when the gold covering may be worn out.

DIFFERENT METHODS

There are four different methods of producing gold plated articles, such as:—

1. Simple Immersion Process, in which exchange with the base metal provides the reason for precipitation. Such deposits are very thin, but the high specific gravity of the deposited gold may be responsible for the unusually good properties of these films.

2. Single Cell Process, in which the current used is generated by a zinc anode suspended in a common salt solution contained in a porous, the work constituting the cathode when hung in a suitable gold solution containing also in the porous cell. Slightly thicker deposits are possible than with simple immersion.

3. Electro-gilding, in which there is an external source of electrical power.

4. Mercurial Gilding, the gold being applied as a pasty amalgam.

Let us now deal with each of these processes in a concise manner.

CLEANING THE ARTICLES

The complete success of the process of electro-deposition depends upon the manner in which the work is prepared for the vat. If the surface of the article is not clean, the deposit will not perfectly adhere. For good adherence, the surface must be free from all greases, dirt, oxides (scale and rust), and liquids from vats through which the work has passed on its way to the plating work. Hence cleaning of the articles is urgently required.

There are three kinds of cleaning processes, namely:—

(i) Chemical.
(ii) Electro-chemical.
(iii) Mechanical.

Chemical Cleaning

The agents used in chemical cleaning are:—

(a) Alkalis, e.g., caustic potash, which removes grease.

(b) Cyanide——usually cyanide of potassium to remove oxides and stains from copper or brass.

(c) Acids——e.g., hydrochloric or sulphuric acid to remove oxides, such as scale or rust from iron or steel.

Removal of Grease By Potash.

A solution containing 4 to 12 oz. caustic potash and 1 gallon water is made, the lower strength for non-ferrous metals. The solution is first heated in iron vessel to about boiling point and the articles suspended on wires or loaded in

baskets, are immersed in it. A chemical action then occurs between the grease and the potash with the formation of soap, which readily dissolves in the water present.

REMOVAL OF OXIDE BY CYANIDE.

Cyanide of potassium removes oxides and stains from most non-ferrous metals e.g., copper, brass, silver, etc.

The solution should contain 4 to 8 oz. cyanide of potassium and 1 gallon of water and be held in an earthenware vessel, covered with a lid when the solution is not in use.

Clean the article in potash, rinse in water, immerse in the cyanide solution till the surface is clear, and again rinse in water.

REMOVAL OF OXIDES BY ACIDS.

A 5 to 10 per cent. (by volume) solution of hydrochloric acid or one of ·10 per cent. sulphuric acid will dissolve oxides (including rust) on the surfaces or iron or steel and also will dissolve out scale.

MECHANICAL CLEANING

Mechanical scouring is employed as an aid to both chemical and electro-chemical cleaning. The article must first, be washed with caustic potash to remove grease and then it is immersed in acid dip. After remaining in this for a while, the article is removed and rinsed. The article is now brushed with a bristle brush that has been rubbed in powdered pumice so as to remove almost all detritus materials from the surface.

ELECTRO-CHEMICAL CLEANING PROCESSES

It is necessary, at the outset, to state briefly that the process consists in removing by means of the electric current such materials as exist on the surface of the work. The method of doing so is as follows: The work is suspended from the anode or cathode rod of a vat, put together in all respects as a plating tank but having as liquid contact a solution of some chemical, such as an acid, or cyanide, or potash, which, in solution, is a good conductor of electricity. Whether the solution is an acid or an alkali depends upon the work required to be done. Removal of scale and thick rust is effected in an acid solution; for removal of a thin layer of rust, or of grease, and sometimes, of tarnish, an alkaline solution is used. A heavy current is then passed through the solution for 10 to 15 minutes by which time the whole of the impurities are dissolved out, leaving the surface of the work bright and clear.

SIMPLE IMMERSION PROCESS

This method is generally used in plating cheap jewelleries. The solution contains a little gold, which is replenished from time to time by further additions. A typical composition may be as follows:—

Sodium Cyanide	40	grams.
Sodium Carbonate	40	,,
Distilled water	1000	c.c.

To this solution gold is added possibly to the extent of 6 cwt. per gallon or 2 grams per 1000 c.c. The gold is dissolved in a mixture of strong hydrochloric acid and nitric acid usually in the proportion of 3:1 by volume and excess of acid evaporated off over water-bath in a porcelain basin. The gold chloride so obtained is dissolved in water, precipitated by ammonium hydroxide, proceeding a brown precipitate of gold fulminate. This is filtered but while still wet is washed into the above solution, when with warming, it readily dissolves. In handling the fulminate you should be careful that in no circumstances it is dried up as it becomes explosive in the dry condition.

In plating time the solution is kept hot, say upto 30°C and the article to be plated,

cleaned in the usual manner, immersed in it. While almost every metal will turn out gold from this solution, the most satisfactory deposits are obtained on copper and its alloys, and other metals are, therefore, coated with a film of copper or brass.

SINGLE CELL PROCESS

In this process the gilding solution is weaker than that for immersion. It is made up of several other ingredients such as sodium ferrocyanide, etc. which probably play some part in the production of thicker deposits. A gilding solution may be composed of as follows:—

Sodium ferrocyanide	3½ oz.
Sodium phosphate	1¼ ..
Sodium sulphite	1/12 ..
Distilled water	160 fl. oz.

This solution is made up and the gold fulminate as prepared above is added into it to give a content of 3 to 4 dwt. of gold per gallon. The solution is boiled for a few minutes, and any deposit may be filtered off.

The arrangement of the cell is simple. A zinc rod or sheet is suspended in a saturated solution of sodium chloride, contained in a well-clean porous pot, standing in the gold solution. Now the cleaned article to be plated is suspended in the gold solution, its suspension wire being connected to the zinc. Then zinc passes anodically into the salt solution while gold is deposited on to the work as cathode. The gold solution is replenished by occasional additions of gold fulminate.

ELECTRO-GILDING PROCESS

This method is commonly employed for the deposition of gold, any desired thickeness being applied at one's own free will. Solutions for this purpose contain varying quantities of gold, from a few dwt. per gallon upwards.

It should be understood that in electro-gilding all solutions are composed of the cyanide type though the final composition may be achieved through different stages. The methods of preparations are few and relatively simple. A brief description of their preparations and methods of application as described by Messrs Samuel Field & Dudley Weill in their book Electroplating is summarised as follows:

Starting with the gold in the "fine" state, this is dissolved in a mixture of strong hydrochloric and nitric acid in the proportion of 3:1 by volume. Strongly acid fumes are given off, the operation being carried out in open air. When the gold is dissolved, excess of acid is evaporated off, very great care being taken not to overheat the gold chloride residue, which is readily decomposed by slight elevation of temperature. The gold chloride is redissolved in a small proportion of water, and re-evaporated to get rid of last traces of acid. Two methods of procedure may now be followed.

(a) The gold is precipitated with ammonia, a yellowish-brown product, known as fulminate of gold, being obtained. This is filtered and washed with water, care being taken that it does not become dry, as it is then explosive. A solution of potassium or sodium cyanide of suitable strength is prepared and the fulminate washed and dissolved in it. This provides the solution.

(b) Alternatively, the gold chloride can be directly added to the cyanide solution, when the usual yellow colour of the chloride disappears by the transformation of the salt into the double cyanide (AuCN.KCN). By this method a small proportion of alkali chloride remains in the solution. The amount is too small to be regarded as detrimental, especially in view of the impurities usually introduced by the frequent additions of free cyanide.

Using either of these methods the following quantities may be taken as some guide:—

Gold	½ oz. troy	3.4 gm.
Total KCN 3	oz. av.	19.0 „
Water	1 gallon	1 litre.

The solution, however prepared, is est heated before operating it.

Additions of sodium phosphate and a educing agent are common, the former ubstance acting not primarily as a conducting salt but giving rise to complex ompounds which reduce the metal iron ontent and thereby increase the density f the deposit.

N.B.:—KCN is potassium cyanide.

Another recipe of gold plating solution ollows:—

Gold	10	parts.
Ammonia (Sp. gr. 0.88)	50	„
Potassium cyanide	27	„
Distilled water	1000	„

The gold is dissolved in aqua regia l part nitric acid and 3 parts hydrochlo- : acid) using heat; the solution, contain- g chloride of gold; is precipitated with ımonia—carefully and till no further ecipitate is formed; the precipitate is en filtered and washed, but on no count allowed to become dry; the wash- precipitate is then dissolved in the anide of potassium.

The preparation of gold solution is a ıtter for skilled and careful work. The ıployment of pure gold salts ready for e is recommended.

WORKING THE SOLUTION

In carrying out the gilding operation o main results are to be achieved: (1) : desired thickness, apart from current ciency, and (2) colour.

The colour of gold deposits varies :h many conditions. With cold solu- ns and low C.D. the colour is pale and ıttractive. With increased C.D. and at higher temperature (up to 60°C. and :r) the colour assumes a more pleasing ıde, generally regarded as a warmer tone. Excessive current induces burning, with a "foxy" and powdery deposit. This is essentially a case in which the personal judgment of the operator is of the greatest value. In any case, both the P.D. and C.D. are low, and usually best left not specified.

N.B.:—P.D. is Potential Difference & C.D. is Current Density.

Internals are gilt by filling the vessel with the solution and applying an internal anode, while awkward corners and badly plated spots are easily "doctored." A gold anode is to be recommended. It dissolves quantitatively, and should not be allowed to remain in the solution when not in use. Generally the anode efficiency exceeds cathode efficiency, the solution becoming enriched with metal. Many gilders, therefore, prefer to work with a small insoluble anode, which may be of platinum, and make occasional additions of gold salts.

VARIATIONS OF COLOUR OF DEPOSITS

Additions to the solution may effect large changes in the colour of the deposit. Co-deposited copper produces a redder shade—"red or rose gold"—while the addition of small proportions of silver solution effects a greenish tint in the deposit known as "green gold." Again, the addition of nickel cyanide or zinc cyanide very much reduces the colour of the gold to what is called "white gold." Dead gilding is effected by depositing the gold on a surface obtained either by severe pickling, sand-blasting, or copper deposition from the sulphate bath. The judicious application of dead and bright deposits may be used to much decorative advantage.

Where thicker deposits are required, recourse to quicking is advantageous with occasional scratch-brushing, after which operation the suspension wire should be applied in another position, as wire marks are liable to be very prominent.

CARAT PLATING

In the production of coloured deposits, success in the maintenance of an exact shade is a matter of the most careful control. These difficulties led to the investigation of the deposition of gold alloys, or as it is termed, "plating to carat."

Thus a satisfactory and consistent 18 carat green gold may be obtained from the following solution:—

Au as Na Au $(CN)_2$	2.00	gm. per litre.
Ag as Na Ag $(CN)_2$	0.75	,, ,,
NaCN, free	4.00	,, ,,
$Na_2 CO_3$ anhydrous	5.00	,, ,,
$Na_3 PO_4$	20.00	,, ,,
$K_2 SO_3$	5.00	,, ,,

The solution is worked warm and at a low curren density. The metal content is replenished from the anodes while redder deposits are obtained by replacing the silver with copper.

MERCURIAL GILDING PROCESS

In this process a pasty amalgam is made by adding mercury to heated gold and squeezing out excess of mercury through chamois leather.

Its application to the article to be gilded is made by cleaning the article in the usual manner, and rubbing it over with a wire brush which has first been dipped in a solution of mercuric nitrate. This serves a similar purpose to quicking, leaving a film of mercury on the surface of the metal. The gold is applied by passing the wire brush over the amalgam and then over the work. This applies an even layer of amalgam. To increase the final thickness of the gold deposit, this operation is repeated a number of times, after which the work is rinsed and dried. The mercury is now expelled by heating in a muffle or over a dull charcoal fire. Mercury volatilizes at 390°C., leaving the gold as a pale yellow deposit, which is rendered more uniform by scratch-brushing. The colour of the deposit is enhanced by passing the work through a mixture of alum, nitre, and salt in the form of a paste. The work is now dried over the dull fire, and heating continued until the residue of salts just fuses. It is then plunged into water to remove the fused salts, after which it is rinsed. This colouring operation can be repeated at will.

RECOVERY OF GOLD

The high cost of the metal necessitates every care to prevent loss. A small volume of first rinsing water should, therefore, be religiously used and returned to the bath as make-up water. Stripping of gold deposits is effected with ease by making the work anode in a week cyanide solution, say 5 per rent. sodium cyanide, with a small iron cathode. The gold rapidly disappears from the anode, and the solution can be reserved for the recovery of its gold contents. This, with old solution and a certain amount of sweep, will always be taken over by an assayer, who has no difficulty in extracting the metal content. In order to reduce the bulk of solution to be handled, the cyanides may be decomposed with acid, HCN being expelled. The solution then receives an addition of ferrous sulphate, which, in the course of a few hours (the mixture may be allowed to stand overnight), deposits the gold as a brown powder, which is recorvered by sedimentation, filtering and cupelling with lead or other type of furnace treatment.

—FIXATION OF PERFUMES

NO success is possible in perfumery business unless suitable fixers have een employed. It is a common belief nong many perfumers that a given ibstance or mixture of substances which rms a successful fixative for one perime, must necessarily be a good fixative r others. This is extremely erroneous.

The functions of a fixative are :veral. In the first place it may be said enerally that it is intended to keep the erfume, so that its fragrance shall last or as long as possible after the evaporaon of the solvent. But this is by no eans all. In most perfumes the rate of vaporation of the various constituents is ery different, and what one may call, ie scientific duty of the fixative is to qualise as far as possible these different ites of evaporation, so that the fragrance f the perfume shall remain as nearly as ossible during the whole period of s evaporation. This of course is an ideal im, which can never be attained, but the ppropriate fixative will attain this ideal s far as possible, and should then so act iat no crude odour appears at any time uring the evaporation. The oldest fixig agents we know, of, and which were vell known to the ancient are, curiously nough, of animal origin—civet, musk, mbergris and castor. To-day, especialy with the advent of the synthetic erfumes industry has made such vast rogress, the art of fixation of perfumes as much altered. A number of substanes of purely vegetable origin, and many f synthetic origin, form important igredients of our modern Fixatives.

Further, many bodies of powerful dour possess fixative properties, so that o-day the modifying perfume value of a xative has to be taken into account as well as its fixative properties. Hence a given substance may be used as a fixative in one type of perfume, but must be rigidly excluded from another. The most important basic substances used in fixatives may be grouped as follows:—

1. Animal substances, such as civet, musk, and ambergris. All the three of these can be practically replaced by artificial corresponding bodies but we should not like to say that the latter are quite so satisfactory as the natural substances.

2. Vegetable substances, such as balsams, oleo-resins, resins and essential oils. Of the last named sandalwaad oil stands out pre-eminently not only on account of its low volatility but also on account of its fine odour, which blends so well with so many different types of perfume.

3. Synthetic substances — some of which are nearly odourless, and therefore of general applicability, others being of high perfume value, and therefore suitable for use both as fixative and a modifier.

Before further discussing on this subject we would say that there are numerous proprietary substance sold as fixatives, many of which are the result of much scientific research. Many of these are of great value and will be found most useful to the perfume manufacturer.

The following practical illustrations will be a guide to the perfumer in selecting the fixative ingredients.

Sandalwood oil is (a) a substance of very high boiling point and has therefore possessed great fixative properties, (b) has very little colour. and may therefore be used without fear of ultimate discoloration of any substance to which it is applied, (c) has not tenacious a perfume

that it may be used in large quantities where the oriental type is desired, and has at the same time enormous fixative properties, (d) is so delicate in odour that it may be advantageously used in small quantities where the dominant odours of sandalwood is not desired. Here it acts as a beautiful modifier of the bouquet, and assists in the production of a personal creation and at the same time exerts its high fixative value.

Such artificial compounds as benzophone, indole, methyl-naphthyl ketone, artificial musk, and nerolin have all good fixative values, but have such intensely characteristic odours that they will only blend with certain other perfumes, and must be used with great discrimination. This type of fixative is of extremely great value.

Such fixatives as natural balsams, resins, and oleo-resins, and certain synthetic representatives of these bodies, are of beautiful odour, excellent fixative value and blend well with numerous perfumes. Their dark colour is, however, in many cases, against their application except in very small amounts, and when possible colourless synthetic representations of them should be employed where this difficulty arises.

Such fixatives as benzyl benzoate and diethylphthalate are substantially odourless and may be used in any perfume where nothing but a diluent and fixative is required.

The following may be taken as illustrations of a number of the most suitable fixatives which may be used in conjunction with sandalwood oil for a fairly wide range of perfume types. It is to be understood that where definite chemical compounds are suggested the pure body is intended, but where such substances as styrex resin, artificial amber, etc., are suggested, there are numerous proprietary brands sold under fancy names, from which the practical perfumer may select that which suits him best. Many of the substances here enumerated are not only of fixative value, but contribute to the perfume.

Odour Type

Acacia—Balsams of tolu and peru, myrrh, musks all types, vanilla, cinnamic alcohol, hydroxy-citronellol, indole, civet (the last two in traces only).

Carnation—Amber, styrex, benzoin, vanilla, musks, benzyl-iso-eugenol, baldanum, clarysage oil, mousse-de-chena.

Eaude Cologne—Beta-napthol ethers, benzyl-iso-eugenol, clarysage oil, the cinnamic esters, benzoin, ambergris, benzyl benzoate, musk natural.

Heliotrope—Benzoin, balsams of tolu and peru, styrex, bromostyrolene, vanilla, cinnamic alcohol.

Hyacinth—Amber, styrex, baldanum, benzoin, musk, cinnamic alcohol, mousse-de-chene, indole (in traces), bois-de rose oil, costus.

Jasmine—Balsams of Peru and tolu, benzoin, styrex, hydroxycitronellol, bois-de-rose oil, benzyl salicylate, Cinnamic alcohol, civet and indol (in traces).

Lavender—Benzoin, styrex, musk, amber liquid, clarysage oil, mastic, lavender.

Lily of the Valley — Aldehyde C, Orris, Hydroxy citronellol, bois de rose oil, amber, terpineol, terpinyl acetate.

Narcissus—Para-cresyl acetate, terpenol, cinnamic alcohol, amber, musk, cortus, benzoin, labdanum, balsam of tolu.

Champaca—Benzyl-iso-eugenol, ambrette, olibanum, tolu, vanilla, musk natural, cinnamyl cinnamate.

Lilac—Hydroxy-cetronellol, vanillin, tolu ambergris, peru balsam, benzoin.

Mimosa — Cinnamic alcohol, peru balsam, mastic, tolu balsam, musks.

Magnet—Hydroxy citronellol, benzoin, civet.

Tuberose—Balsam of peru, iso-butyl benzoate.

Verbena — Cistus. chemi. copaiba. benzoin, styrex, vanillin, olibanum, orris oleo-resin.

New-Mown Hay— Acetophenone, banzylidene acetone. coumarin, methyl acetophenone, dimethyl-hydroquinone, moussede chene, methyl benzoate, styrex.

Orchid—Mousse de chene. phenyl acetic acid, benzoin, musk. vanillin, styrex, balsam of peru, coumarin, amyl salicylate, oakmoss, ylang ylang.

Rose—Amber, musk, vetivert oil, patchouli oil, styrex, phenyl ethege alcohol, cinnamic alcohol, hydroxy citronellol, ionone (traces).

Sweet Pea—Benzylidene acetone, phenyl acetic esters, styrex, balsams of peru and tolu, hydroxy citronellol, bois de rose oil.

Trefle—Benzoin, mousse de chene, balsam peru, benzyl-iso-eugenol, musk, ylang ylang oil, amyl salicylate, clarysage oil, dimethyl-hydro-quinone.

Violet—Orris, oleo resin, , amber ylang ylang oil, vanillin, benzyl-iso-eugenol.

Wall flower--Benzoin, musk, benzyl -iso-eugenol, ionone, para-cresyl methyl ether. mousse de chene.

Ylang Ylang—Benzoin, myrrh, balsams of peru and tolu, para-cresyl methyl ether, benzyl alcohol. methyl-iso-eugenol.

A judicious addition of sandalwood oil is of advantage in practically every one of the above cases.

—How to Make Wax Fruits and Flowe

IN writing these notes on wax-work, we do not make any claim to a special process, but simply to show how you can make, and how dozens of people are making, some very beautiful imitations in wax, of various fruits and flowers in a very simple and easy manner. The necessary things include 4 lbs. of medium sand, a large tray, a basin, a wooden spoon, and a small table-knife.

We now come to the articles that must be purchased and kept dry and clean.

These are:—

For mould: a 7 lb. bag of best fine plaster of Paris; for model, 3 or 4 lbs. of best white paraffin wax.

It will also be necessary to have a small quantity of each of the following dry colours: Ultramarine blue, Prussian blue, Carmine, Rose pink, purple, scarlet powder, chrome-yellow, chrome-green, and any other colour that taste may suggest. One bottle of balsam fir and some fine wire will also be needed.

We will commence by making a lemon. Take the basin and stand the lemon upright in it; surrounded the lemon evenly with sand till you have covered exactly half, so that one-half projects from an even layer of sand. You now encircle the visible half of the lemon by a band of paste-board that is exactly one inch larger in circumference than the fruit; this band should be 2 inches high. Now in the tray mix enough plaster of Paris to the thickness of a stiff cream to cover the half of the lemon with a coat ½ inch thick. Having got it to the right thickness, pour it to cover the half lemon, taking care that an even coat is deposited. The cardboard circle will prevent plaster running away. Keep it in this condition till it is hard enough to handle; then t it up gently, take out the fruit with injuring the fine indentures of the p in the interior of the mould, remove sand that may be clinging to the base the half mould, and make in the rim o four holes large enough to hold a la pea. Grease the rim and holes with little oil and fat mixed, replace the lem in the mould exactly as it was when moved, taking great care in that resp fix a card rim round the outer edge of half mould, and you are ready to c plete the mould. Wash from your ut sils all traces of the previous plaster; is most important. Mix fresh plaster, pour it over the other half of the lem taking care that this is not as thick previous plaster. Your fruit is now c pletely coated with plaster. Let this as before; when it is ready, insert a k between the joint and set it apart w out damaging the interview; take out fruit, and you have the mould compl Let the mould set aside for half an h before actually used in casting.

CASTING

We now come to the easiest par the business; we refer to casting the w Melt in a covered basin enough par wax to well mix sufficient chrome-yel to make the colour into it. Now take mould and immerse it in hot water f minute; then add little balsam fir to wax, and pour it into one of the moulds. Mix the other half on, and ing the mould in the hands, press halves together, and shake the whol the air in a manner that the wax is b run evenly over the interior of the mo Do this for 10 minutes; then plunge hands with the mould into cold water, leave it there for 2 minutes; take it

[illegible] the mould, and you have your lemon complete.

In this way almost anything that is mouldable—including fruits, nuts, vegetables, etc.—may be produced; and wax working is not only instructive and pleasant, but in the hands of a smart person remunerative.

CASTING FLOWERS AND LEAVES

In casting flowers and leaves we shall require a sheet of glass 18 inches square. Put some soft soap in hot water in a bath, and stir it well till it lathers. Warm some of the wax as for fruit, adding a little of the fir; colour according to work in hand. When the soap water in the bath is blood-warm, and the wax melted and coloured, steep the glass in the water, take it out, plunge it into the warm wax, and when it has an even coat of wax on it, plunge it into the water again; you will thus obtain a smooth sheet of wax. Lay this on your board, dry it, and lay a natural leaf on it, making the veins on the wax with the thumb-nail. Cut out the shape of the leaf with a sharp penknife, and curl by bending over the finger or back of the hand. Join the leaves by the aid of fine wire, and mount under glass case. Practise leaves, and you will shortly be able to make flowers. These are more difficult than fruit or leaves, as there are no moulds. Take a rose, for instance; every leaf has to be made separately of very thin wax, and joined by wire. Keep on trying, however, as the same wax will do over and over again.

We here annex a short table as a guide to colouring. "Cast" means the colour the wax should be made while warm. "Applied" means put on dry after fruit is completed.

Fruit	*Cast*	*Applied*
Apples	Chrome Yellow	Greenish touches ad lib.
Banana Melon	Chrome Yellow	Greenish touches as nature.
Cherries	White of Pale Yellow	Touched up with lake as nature.
Egg Plums	Chrome Yellow	Touched up greenish as manufacture.
Filberts	Green	
Oranges	Different parts yellow and red lead well mixed in the wax casting.	
Pears	Yellow	Touched up to nature.
Plums	Prussian blue and red well mixed before casting.	
Pineapple	Yellow	Experiment with gamboge.
Pome Granate	Burnt umber	Touched up with purple to nature
Peach	White	Touched up with chrome-yellow and lake.
An Egg	White	Touched up with chalk.

In conclusion, we would mention here that the success of this undertaking entirely depends on cleanliness; not a particle of dirt must be mingled with the ingredients. In mixing the plaster always remove all traces of one lot before mixing the next. The mixing and applying of plaster of Paris should be done very quickly, as it commences to dry immediately. The balsam of fir makes the flowers and fruit withstand the heat of summer without melting, as they are liable to do without it.

—STATE TRADING

)ULD the Government of India be in sole charge of importing food , fertilisers, steel, cotton and export-)al, cotton, etc. had long been the t of controversy. While the Govern- upheld the measure on grounds of ency, economy and facilities of based on international bartering, the ercial people condemned it in the t of private enterprise, specially as it is for the line on account of g experience and efficiency. The was therefore referred to a ittee in October 1949 with Dr.) Rao Deshmukh as Chairman. The ittee on State Trading has now ted the Report after an examination whole position.

its report which is unanimous the ittee has observed that while in ypes of business undertakings, State j is not desirable it is justified in other types of business, particular- the field of international trade in countries like the U. S. A. Canada, the Committee points where State trading is, as a ooked upon with disfavour and economic policies are designed ily to foster private enterprise, a measure of State trading has not ound incompatible with the general nic policy. In the U. K., for le, as much as 50 per cent of the imports are being handled by ment agencies. The State Trad- ommittee therefore strongly recom- establishment of a Statutory Sponsored Trading Corporatic ver, in the first instance, all th and export operations of a commer- ature which are at present being d by the Central Government.

STATUTORY BODY

The proposed Corporation, the Committee recommends, should be a statutory body with an authorised capital of Rs. 10 crores and an initial capital of Rs. 2 crores. Not less than 51 per cent of the capital should be held by the Central Government and the balance should be offered to the State Governments and private enterprise. The Central Government should guarantee the capital and also a minimum dividend to the private shareholders. The Corporation should be subject to taxation like any other commercial concern. It should function on business principles and its day to day working should be managed by an Executive Board composed of businessmen of proved integrity with a Managing Director acting under the orders of the Board. The first Board and its Chairman should be nominated by the Government.

FUNCTIONS OF PROPOSED CORPORATION

The following are the main recommendations of the Committee in regard to the functions of the Corporation:—

(a) It should take over from the Government of India the commercial operations in respect of imports of foodgrains, fertilisers, steel, East African cotton and also such operations as are necessary for implementing barter agreements concluded by the Government;

(b) the Corporation should be given the monopoly of export trade in coal and short staple cotton;

(c) the Corporation should undertake export trade in the products of cottage industries, on a pioneering basis, as initially

vi on ar cia ed ty be M ing tio rec tin

private enterprise cannot be paying. When a proper market has been created abroad for cottage industry products, the Corporation should curtail its activities and encourage private enterprise to enter the field;

(d) the Corporation may advise the Government, from time to time, whether State trading should be extended or withdrawn from any commodity in the national interest. The Corporation should not be free, however, to extend its trading activities to any commodity without the prior approval of Government;

(e) the Corporation may act whenever required in the capacity of either a principal or an agent for direct purchase and sales by any foreign Government in less the Indian Market; and

(f) on request by Indian traders, the Corporation may undertake, on their behalf and at their risk, negotiations with foreign traders.

ESSENTIAL COMMODITIES

The Committee has also given their ws in regard to the import and export certain essential commodities. These :—

Raw Jute.—Indian Jute Mills Asso-ion should adopt a system of centralis-buying;

Non-ferrous Metals.—The desirabili-of reintroducing State trading should examined by the Corporation;

Jute Manufactures, Shellac and nganese.—The question of State trad-should be examined by the Corpora-after it has gained some experience;

Tea and Mica.—State trading is not mmended at this stage;

Coal.—State trading should be con-ed;

Sugar.—The question of State trading will not arise until internal production increases sufficiently to leave a surplus.

The committee has laid considerable emphasis on the need for utilising the services of national banking, shipping and insurance companies in connection with State trading; it has also urged for re-organisation of internal trade on co-operative lines. If the banking, shipping and insurance services in the country are utilised properly in promotion of State trading, the Committee feels, it would help the State considerably in giving effect to its economic policies in spheres other than trade. Similarly, a progressive re-organization of internal trade on a co-operative basis will, in the Committee's opinion, obviate the necessity of extending the scope of the Corporation's activities, as co-operation offers a form of control which, while securing all the benefits of State trading, preserves the advantages of private enterprise. The Committee feels that regulation of the distribution of imported commodities can best be carried out by setting up a network of co-operative consumers' stores with an Apex Store in each State directly linked up with the State Trading Corporation.

IMPORT CONTROL POLICY

Another recommendation made by the Committee is on the need for rationalisation of import control policy and procedure of the Government. It says that if the Government were to adopt the practice of not placing any article on an Open General Licence until after the interim period of liberal licensing designed to restore normal marketing conditions so far as that commodity is concerned is over, the chance of large speculative imports taking place would be greatly minimised.

TRADE MARKS, PATENTS AND DESIGNS

TRADE Marks, Patents and Designs are inalienable rights of "Industrial Property." Fundamentally the basic principle operating behind this is "observance of the rights of ownership." Every modern business is associated with one or more of these Rights in different forms of protection. For the protection of these Rights all civilized countries, including India, have made special legislations, The broad principle underlying these legislations is that honesty must be observed in business, and at the same time, the public saved from deception and fraud and that the "originality of thought" of a person is the property of its originator, which entitles him to enjoy to the full benefits which it gives, without interference from others.

We shall now discuss what these Trade Marks, Patents and Designs are and how they can be protected in India.

(1) *A Trade Mark*, means:—

"A mark used, or proposed to be used in relation to goods for the purpose of indicating, or so as to indicate, a connection in the course of trade between the goods and some person having the right, either as proprietor, or as registered user, to use the mark whether with or without any indication of the identity of that person."

It is protected in India by *Registration* under Section 14 of the Trade Marks Act, 1940.

(2) A *Patent*, is:—

A grant from the Government, conferring on the grantee, for a limited term, the exclusive privilege of making, selling and using an "Invention," and also authorising others to do so.

Invention means:—"Any manner of new manufacture, which includes any art, process, or manner of producing, preparing, or making an article, and also any article, prepared or produced by manufacture."

Inventions are protected by Patents granted under Section 3 of the Indian Patents & Designs Act, 1911.

Patent is really a limited monopoly, for a contract between the inventor and the public, through its agent, the Government of the country, in exchange for a fair and full disclosure of the invention, for the ultimate benefit of the public, on cessation of the monopoly.

(3) A *Design* means:—

Only the features of shape, configuration, pattern or ornament, applied to any article by any industrial process or means, whether manual, mechanical or chemical, separate or combined, which in the finished article appeal to, and are judged solely by the eye."

It is protected by Registration under Section 43 of the Indian Patents & Design Act, 1911.

The Relations of Trade Marks, Patents and Designs with Industry and Trade are matter of vital importance to the Industrialists and Manufacturers, Traders and Merchants. They make constant efforts to utilize their rights to gain competitive advantages over their rivals by *protecting their rights*, as provided under the laws of different countries. There are a very large number of *Pitfalls* in the protection of these rights in different countries. Particularly the Exporters and Importers are, therefore, advised to take proper notice and care in due time of their such rights.

It is well known that the *commercial value of a manufactured product* depends largely upon such important factors as:—(1) the reputation established for it in trade, (2) the manner of production and its utility, and (3) the attractiveness of its appearance, which are secured and protected by Trade Marks, Patents and Designs respectively.

In fact Trade Marks, Patents and Designs are the "corner stones" of the development of modern industries and trade. As legal technicalities are involved in drafting them, it is essential that these be framed strictly in conformity with the prevailing laws and bye laws.

T. P. Datta B.E. M.I.E. (India)
Patent Attorney & Registered Trade Mark Agent.

AUTHORITIES IN INDIA COMPETENT TO ISSUE CERTIFICATES OF ORIGIN

The following is a list of Chambers of Commerce and Trade Associations in the Republic of India competent to issue Certificates of Origin under Article II. of the International Convention relating to the Simplification of Customs Formalities, 1923:—

1. Bengal Chamber of Commerce, Royal Exchange Building, 2, Netaji Subhas Road, Calcutta.
2. Bengal National Chamber of Commerce, P-11, Mission Row Extension, Calcutta.
3. Bharat Chamber of Commerce, Imperial Bank Building, Harrison Road, Burrabazar, Calcutta.
4. Bombay Chamber of Commerce, Mackinnon Mackenzies' Building, Ballard Estate, Bombay.
5. Indian Merchants' Chamber, Lalji Naranji Memorial, Indian Merchants Chamber Building, Backbay Reclamation, Churchgate Street, Bombay.
6. Madras Chamber of Commerce, Dare House, First Line Beach, Madras.
7. Southern India Chamber of Commerce, Indian Chamber Buildings, North Beach, Madras
8. Southern India Skin and Hide Merchants' Association, Sydenhams Road, Periamet, Madras.
9. Tuticorin Chamber of Commerce, Tuticorin.
10. Cocanada Chamber of Commerce, Coconada.
11. Godavari Chamber of Commerce, Coconada.
12. Cochin Chamber of Commerce, Cochin, Travancore, Cochin State.
13. Calicut Chamber of Commerce, Calicut.
14. Coimbatore Chamber of Commerce, Coimbatore.
15. Upper India Chamber of Commerce, Civil Lines, Kanpur.
16. Punjab Chamber of Commerce, Scindia House, New Delhi.
17. United Provinces Chamber of Commerce, 15/134, Civil Lines, Kanpur.
18. Indian Chamber of Commerce, 23B, Netaji Subhas Road, Calcutta.
19. Mysore Chamber of Commerce, Bangalore.
20. Chamber of Commerce, Negapatam.
21. Marwari Association, 160A, Chittaranjan Avenue, Calcutta.
22. Nagpur Chamber of Commerce Limited, Near Cotton Market, Nagpur.
23. Salem District Chamber of Commerce, Salem.
24. Andhra Chamber of Commerce, 9, Armenian Street, G.T., Madras.
25. Travancore Chamber of Commerce, Alleppey, Travancore, Cochin State.
26. Madras Provincial Foodgrains Merchants' Association, 40, Anderson Street, George Town, Madras.

—PHARMACEUTICAL RECIPES

FRUIT SALINE

Bicarbonate of soda 2 oz.
Tartaric acid 2 „
Cream of tartar 2 „
Citrate of magnesia 2 „
Epsom salts 2 „
Sifted sugar 2 „

Dry the ingredients separately by putting tem by the side of a stove or oven. Then mix ell and bottle for use. Adult dose: One tablespoonful to a tumbler of water.

COMPOUND RESORCINOL OINTMENT

Resorcinol 60 grams.
Zinc oxide 60 „
Bismuth subnitrate 60 „
Birch tar 60 „
Petrolatum 250 „
Yellow beeswax 100 „
Wool fat 280 „
Glycerin 130 „

Mix the beeswax and wool fat in a dish or water bath. Rub the zinc oxide and bismuth ubnitrate with the petrolatum until smooth nd add it to the melted mixture. Dissolve he resorcinol in the glycerin, incorporate the olution with the warm mixture just prepared, hen add the oil and stir the ointment until it ongeals. It is an excellent cure for ringworm, czema, itches, and other skin diseases.

SODA MINT TABLETS

Sodium bicarbonate 25.0 grms.
Oil of peppermint 0.3 c.c.
Light liquid petrolatum 1.0 c.c.
Starch, in fine powder to make 100 tablets 4.0 grms.

Mix the oil peppermint and liquid petrolaum with the starch, add the sodium bicarbo- ate, and mix thoroughly by gentle trituration.
Compress in a tablet machine using 8 mm. ie and punch to make 100 tablets.

CREAM FOR BURNS

Sulphanilamide 3 parts.
Glycerin 10 „
Peanut oil 25 „
White beeswax 10 „
Distilled water 52 „

Mix the first two and last three ingredients eparately, then mix together.

ANTI-RHEUMATIC LINIMENT

Capsicum 1 oz.
Oil of turpentine 1 pint.
Menthol 1 oz.
Oil of origanum 3 dr.
Oil of gultheria 1 oz.
Oil of camphor essence 1 pint.

Macerate the capsicum with the turpentine il and then add the other ingredients one by ne.

STICKING PLASTER

Resin (in powder) 2 parts.
Litharge plaster 16 „
Curd soap 1 part.

Melt the plaster with a gentle heat, add the resin and soap, first liquefied and mix. Apply thinly and uniformly over cotton fabrics.

Now to prepare litharge plaster proceed as follows:—

Oxide of lead (litharge) 5 oz.
Olive oil 12 fl.oz.
Water 8 fl.oz.

Boil them over slow fire, constantly stirring to the consistence of a plaster, adding a little boiling water if required.

REMOVING PIMPLE MARKS

Borax 3 grams.
Potassium chlorate 120 „
Alcohol 30 „
Glycerine 60 „
Rose water 760 „

Mix and keep aside for a week in a stoppered bottle. Then strain through a cloth and put in phials.

ASTHMA HERBAL DROPS

Tinct. of stramonium 1 part.
Laudanum 1 „
Anise ammonia 1 „
Mix.

Dose 10 to 15 drops in hot sugar water, thrice daily.

LIQUID EXTRACT OF KALMEGH (I.P.L.)

Kalmegh 500 grams.
Oil of fennel 2 millilitres.
Oil of ajowan 2 „
Alcohol (90 p.c.) a sufficient quantity.

Boil the Kalmegh with 1500 millilitres of distilled water for half an hour and strain. And further 1500 millilitres of distilled water, are boiled for half an hour, strain. Repeat the process until a total of 2000 millilitres of the extract are collected. Mix and concentrate to 250 millilitres on the water bath. Dissolve the oil of ajowan and oil of fennel in 200 millilitres of alcohol (90 p.c.), and add this alcoholic solution to the concentrated extract. Determine the content of andrographolide and add enough alcohol to produce a compound liquid extract of Kalmegh of required strength.

Dose: 8 to 15 minims.

CHAULMOOGRA OINTMENT

Chaulmoogra oil 10 grms.
Hard paraffin 40 „
Soft paraffin, white 50 „

Melt the hard and soft paraffin together; add the chaulmoogra oil; stir until cold.

—Recipes for Small Manufacturers

WAX PENCILS

Ceresin	40	parts.
Carnauba wax	32	„
Japan wax	24	„
Talc	50	„
Colour	q. s.	

Melt the waxes together, add the talc and colour, and heat on a water bath for approximately 30 minutes, then pour into suitable moulds.

The colours used are:—

White—Zinc oxide	15	parts.
Blue—Paris blue	12½	„
Red—Cinnabar	15	„
Yellow—Chrome yellow	15	„
Black—Lampblack	8	„

KHUS KHUS ESSENCE

Procure 12 oz. of khus khus root. Free it from dirt and pound it finely. Now soak the powder in 16 oz. of alcohol and keep into a wide-mouthed stoppered bottle. After a month filter through filter paper and keep in bottles for use.

DEPILATORY POWDER

Orris Root	1	oz.
Calcium carbonate	2	„
Barium sulphide	4	„
Borax	1	„

Take barium sulphide in the form of a lump and introduced into a mild furnace, preferably charcoal or coke for 5 to 10 minutes, when it will get decolorised yielding an ashy tint. Take out and cool down. Also treat calcium carbonate in lump in a similar manner. Put them together into a stone mortar and triturate as finely as possible, next combine together orris root and borax according to the above process. Lastly make a union of both the products in the same mortar for half an hour. Take a tea-spoonful of this powder, dilute with water until it forms a paste, which is applied to the spot from which it is required to remove the hairs. After five or ten minutes it is removed by scraping or by washing; and the hair disappear at the same time without damaging the skin.

NAIL ENAMEL

Acetone	400	lbs.
Butyl acetate	300	„
Ethyl lactate	200	„
Dibutyl phthalate	100	„
Phenyl ethyl alcohol	½	lb.
Cellulose nitrate	25	oz.
Eosine (alcoholic solution)	q.s.	

Dissolve the cellulose nitrate in a solution of acetone, butyl acetate, and ethyl lactate. Add the dibutyl phthalate and finally the phenyl ethyl alcohol and the colour solution.

When preparing the above article be careful to have no flame near as some of the ingredients are very inflammable.

BAKING POWDER

Sodium bicarbonate	28	parts.
Cream of tartar	60	„
Maize Starch	12	„

Mix thoroughly and stock in airtight containers.

GLOSSY SPRAY THINNERS

Butyl acetate	53	parts.
Butanol	16	„
Methylated spirit	15	„
Toluol	16	„

Mix.

TAMBUL BIHAR

Liquorice powder	24	parts.
Pollen of keora	24	„
Seeds of cardamom major	3	„
Seeds of cardamom minor	3	„
Cloves	3	„
Cinnamon	3	„
Rose water		q.s.

Mix the above ingredients together and macerate in a stone mortar with requisite quantity of rose water. Then add finely pulverised saffron 3 parts.

GINGER BEER POWDER

Bruised ginger	50	parts.
Cream of tartar	60	„
Powdered sugar	9	„
Oil of lemon	1	part.

Mix intimately and put up in 2 oz. packets.

TRANSPARENT LACQUER FOR TIN

Alcohol	20	oz.
Shellac	1	„
Turmeric	½	„
Red-sanders	½	„

Put the alcohol in a glass flask; add to it the other ingredients one by one. Set the flask in a warm place, shake frequently for 12 hours or more, then strain off the liquor, rinse the bottle and return it corking tightly for use.

When this lacquer is used, it must be applied to the work freely and flowing and laid on the top of stove to dry, which it will do very quickly.

Rose Colour — Proceed as above, substituting ½ oz. of finely ground, best lake, in place of the turmeric.

Blue — The blue is made by substituting pulverised Prussian blue ½ oz. in place of turmeric.

Purple — Add a little of the blue to the gold colour.

Green — Add a little of the rose colour to the above.

—IN THE FIELD OF INVENTION

VULCANIZATION OF RUBBER

A new process for the vulcanization of rubber makes use of mild oxidising agents in place of sulphur (to a substantial extent) normally employed and also eliminate the use of zinc oxides (Industry & Eng. Chem. 1950, 42, 671).

Conventional vulcanization may be considered a two-step oxidation process in which zinc oxide or zinc soap functions through its ability to form zinc mercaptides which are more easily oxidized by sulphur to disulphide cross-links than are thiol compounds. As zinc oxide or zinc soap is required in the second step of the sulphur reaction, the use of a suitable oxidizing agent eliminates the necessity of these materials.

2, 2'—dibenzothiazyl disulphide examined for this purpose readily oxidizes hydrogen sulphide to free sulphur and reacts relatively slowly with rubber. Vulcanization was carried out at 110°C. for a period selected to give the maximum physical cure as measured by stress at 200 per cent. elongation. The replacement of zinc oxide and stearic acid by 2, 2'—dibenzothiazyl disulphide increased physical cure and in air absence of sulphur, but the compound itself is not a vulcanizing agent. The compound was most effective in replacing zinc oxide when it is accelerated with a metal (zinc) salt of a dithiocarbamic acid and brings about the greatest physical cure. At equivalent molecular concentrations methazate and butazate (zinc salts of dimethyl and dibutyldithiocarbamic acid) are equally effective. About 0.0035 mole is required to give maximum physical cure in a compound containing 0.02 gm. atoms of sulphur (0.64 part) and 10 parts of 2, 2'—dibenzothiazyl disulphide. Other milder oxidizing agents which proved effective include quinine dioxime, diazoaminobenzene, bis-(ethoxyphenyliminomethyl)-disulphide, N-nitrosodi-phenylamine, quinone bisphenylimine, 2, 2'—dibenzothiazyl disulphide and benzothiazyl-2-monocyclohexyl sulphonamide. None of the chemicals, effective in the new process, brings about any cure in the absence of sulphur. However, rubber containing hydrosulphide groups can be vulcanized by thiazyl disulphides alone.

—JOURNAL OF SCIENTIFIC & INDUSTRIAL RESEARCH.

HYDROGEN PEROXIDE

A new method for making hydrogen peroxide, the widely used industrial chemical, has been developed in the United States. The new process was described recently before a meeting of the American Chemical Society by Dr. G. L. Putnam and J. F. Sullivan of the University of Washington.

The method involves mixing hydrogen, a by-product of the electro-chemical industry, with oxygen, readily obtained from the air. The mixture is heated to the proper temperature and an alternating current of from 5,000 to 15,000 volts is passed through it.

Hydrogen peroxide is used in the textile and paper industries, in refining oil, in the preparation of gelatin and other products and in photography, tanning and brewing.

CYCLE WHEEL RIMS MACHINE

Messrs. Daniel Smith Limited of Wolverhampton, who for many years have been associated with special machine tools for the production of cycle parts, have announced yet another addition to their list.

The latest is a plant for section rolling welding and helixing of Cycle wheel rims.

The main features are a train of rolls forming the standard Endrick or Westwood Cycle rim in a straight section, simultaneously welding the seam, then sizing and forging the section into a helix in the latter part of the mill.

The equipment provides for variations in speed and a range of from 25 ft. per minute to 50 ft. per minute can be obtained.

The Daniel Smith Limited design has therefore been evolved as a multi-purpose machine and with appropriate tooling and accessories, the plant is capable of rolling light-weight motor cycle rims and cycle mudguards, as well as bicycle wheel rims.

This undoubtedly represents the latest development in variable speed equipment for simultaneous rolling, welding, sizing and forming of sections as above given, also various sections from strip aluminium alloy, non-ferrous and strip, to the capacity of the machine, in straight lengths, eliminating the use of the welding unit as desired.

The constructional details are of that robustness which is typical of the machines manufactured by Messrs. Daniel Smith, Limited. Well proportioned cast iron housings enclose the gears driving the roll spindles, which derive their power from three input shafts through reduction units and distribute the load over the entire length of ehe machine. It is actuated by single shaft running the entire length of the machine and which is geared direct to the variable speed commutator motor. The welding mechanism is pneumatically operated and water cooled. Lubrication is automatic throughout.

—FORMULAS, PROCESSES & ANSWERS

SILVER NITRATE

Silver nitrate is prepared by digesting metallic silver with moderately strong nitric acid; the silver speedily dissolves, especially decomposed yielding oxygen to the silver, and liberating oxides of nitrogen which in contact with air turns brown. The clear solution is then evaporated, either to the crystallising point or to dryness. If ordinary standard silver be used the solution will contain some nitrate of copper; in this case it must be evaporated to dryness, and gradually heated till all the nitrate of copper is decomposed, which may be known by taking a little of the salt, dissolving in water, and adding excess of ammonia; when, if copper be still present, the solution will have a blue tint. When all the copper is thus rendered insoluble, the fused mass is dissolved in distilled water, evaporated and crystallised.

ZINC OINTMENT.

Zinc oxide	1 oz.
Lard	8 „

Mix them together.

ROSE OTTO.

Procure 4 oz. of fresh rose petals all of one colour (say crimson and free them from dust, etc.). Next take 16 oz. of sandal oil in another vessel and heat on the water bath together for half an hour. Take away, throw the petals into the oil, cover up and set aside for one hour. Then squeeze out the oil from the soaked petals and heat the oil again on the water bath for half an hour. Take away and soak in it 4 oz. fresh petals for an hour. Squeeze out the oil and repeat the above process once again. Finally squeeze out the oil and store in a stoppered phial. Put in the sun for one month and it will be clear.

AMLA HAIR OIL.

Take 2½ seers sesamum brayed to a paste, 5 seers emblic myrobalan free from seeds and bruised, and 10 seers sesamum oil. Put the three ingredients together in an iron vessel and place in the sun for one month. Strain out only 5 seers of the soaking oil and put in a fresh lot of 5 seers sesamum oil. Leave aside for one month; strain out again 5 seers of oil and put in a third and fresh lot of 5 seers of oil. Repeat the operation for 6 months. Then strain the whole of the oil and mix together the former quantities. Put in a covered vessel.

Amla oil prepared in this way serves as a good hair dye. Smear the head with it every day half an hour before bath. The hair will be dyed black and no grey hair will be noticeable.

PULP FROM BAMBOO

1146 U.K.D., Bombay—Desires to know the procedure of making paper pulp from bamboo.

Bamboo is found in abundance in the Indian jungles. Of late it is coming into prominence as a paper-making raw material. Much work has been done on it at the Forest Research Institute, Dehra Dun. Very useful information can be found out from the publication on "Digestion of grasses and bamboo" by W. Raitt. On a small scale it may not be possible to follow the details in the book. But it is possible to produce slightly greyish white paper by digesting the bamboo twice with caustic soda instead of following the sulphate (properly speaking sulphide) process. The form in which it is used is the old baskets and mat-makers' shavings, old mats or new bamboos. The new bamboos should be crushed to small splinters by hammering. The internodes being pithy and friable would be reduced to small fragments which should be rejected as they are not easy to digest and appear as cellular specks in the finished sheet.

The bamboo splinters, old baskets and mats are next cut or broken into small pieces of about 3 to 4 inches in size. They are then once washed with water and boiled with 5% caustic soda in the open boiler for four hours. The boiled material is washed and any hard portions are crushed. The material is next digested in small quantities with 15.0% caustic soda at a pressure of 50 lbs. per sq. inch for 6 hours. The digester material is washed and lightly beaten just to loosen the lumps and bleached with 12.0% bleaching powder. This would give greyish white pulp. The pulp obtainable by this method is about 40.0 to 42.0%

In case writing paper is not to be made then the bleaching process is omitted. Such pulps are useful for wrapping and brown paper. They may be coloured with brown colour.

The ultimate fibres of the bamboo cellulose are small and hence the pulps are not beaten hard and are made in 3 to 4 hours time.

KESHAR VILAS

1212 N.J.V., Murtizapur—Wants to have good recipes of Keshar Vilas, etc.

Coriander seed	1	tola.
Aniseed	1	"
Parsley	1	"
Nutmeg	1	"
Ajawan	1	"
Saffron	1	"
Seed of cardamom major	1	"
Seeds of cardamom minor	1	"
Cloves	1	"
Dry rose petals	1	"
Chua	1	"
Camphor	1	"

Take one tola each of the ingredients excepting the last two and soak them in good rose water for 12 hours. Then bray them together to a paste form and incorporate chua and camphor.

GULI ZARDA

Usually beedi tobacco both of good and indifferent quality is taken for making guli zarda. It is pounded, not too finely and sifted through a sieve. It is then kneaded well with an adequate quantity of kimam, i.e. the refuse liquid left over after the preparation of zarda. Knead till a sticky mass like the hookah tobacco is obtained. Now dip the mass into a colour solution (black or red as desired) to give it the well known colour. Sometimes the tobacco dust is first of all dipped in the colour solution and then kneaded with kimam. In that case the zarda will be defective in as much as the colour will not be quite well. For glaze dip the preparation into a solution of gum acacia and allow to dry. This also makes the zarda crisp. Finally, add a small quantity of musk and henna as scent. The quantity to be added depends upon the final scent to be imparted to the stuff. Dry in the sun and pass through a sieve. Finer grains are known as guli zarda while the coarser are retained for use in pati zarda.

SILVER SOLDER FOR FINE SILVERWARE

Silver	3	parts.
Copper	2	"
Zinc	1	part.

Fuse in a fireclay crucible and pour in oil moulds to make into small ingots.

MILK TOFFEE

Sweetened condensed milk	[illegible]	lbs.
Full cream milk	[illegible]	quart.
Sugar	[illegible]	lbs.
Glucose	4	"
Butter	[illegible]	lb.

Vanilla and salt to flavour sufficient.

Cook to crack all the ingredients together in an earthenware vessel or enamel except the last two. Then add the butter and vanilla essence. Pour the hot mass over a buttered marble slab. Lastly cut in cubes of required size and wrap in wax or cellophane paper.

AQUA ANISI

1219 I.A.K., Dhrapha—Desires to know formulas of aqua anisi, aqua caraway, etc.

Anisi oil	1	oz.
Calcium phosphate	2	"
Distilled water	500	"

Triturate the oil with calcium phosphate, and water. Finally filter. This method is applicable in the case of cinnamon water also.

AQUA CARAWAY

Oil Carui	½	oz.
Spt. Rectified	½	"
Magnesium carbonate light	q. s.	
Water to make	2	pints.

Dissolve the oil in the spirit, pour upon about half an ounce of magnesia in a mortar. Stir, gradually add the water and filter.

AQUA ANETHI

Oil Anethi	100	mins.
Water	6	oz.
Spirit rectified to make	18	"

Dissolve the oil in 10 oz. of the spirit, add hot water. Shake well and set aside for a day or two. Decant and filter through 2 dr. of kaolin; then make up with spirit to 18 oz.

EAU-DE-COLOGNE

Bergamot oil	1	oz.
Lemon oil	½	"
Rosemary oil	2	dr.
Neroli oil	30	drops.
Lavender oil	4	dr.
Orange oil	2	"
Rectified spirit	2	lbs.

Mix the ingredients with brisk shaking one by one: Set the whole aside in a stoppered

[illegible] for 2 weeks and during that period shake the vessel thrice daily [illegible] a time, finally filter and pack.

SYRUP OF VASAK (I.P.L.)

1226 R.P.M., Amritsar—Wants to have good recipes of syrup of vasak, peppermint oil, etc.

Liquid extract of vasak	500	millilitres.
Glycerin	100	"
Syrup, sufficient to produce	1000	"

Mix the liquid extract of vasak with the glycerin and add enough syrup to make the product measure 1000 millilitres. Mix thoroughly.

To prepare liquid extract of vasak proceed as follows:—

Vasak, in No. 40 powder 200 grams.

Alcohol (60 per cent.) a sufficient quantity.

Exhaust the drug by the percolation process reserving the first 800 millilitres of the percolate. Recover the alcohol from the remainder of the percolate by distillation, and evaporate the residue to the consistence of a soft extract. Dissolve this in the reserved portion, and add enough alcohol (60 per cent.) to produce 1000 millilitres.

PEPPERMINT OIL

Menth-pep oil is obtained from mentha piperita by the process of steam distillation. The process is completed in four to six hours.

BLUING IRON

1257 R.C.G., Ludhiana—Wants to have a process of bluing iron.

Iron articles may be immersed in the following solution heated to 100°C. for 2-4 minutes.

Caustic soda	36	oz.
Litharge	7	"
Sodium cyanide	2	"
Lead acetate	2	"
Water	50	"
Metol	1	"

WOOD BENDING

1326 E.P.S.V., Batala—Desires to know a process of wood bending.

There are several processes of bending wood. One of the simple processes is to soak the wood in boiling water for 3 to 6 hours, according to its dryness and thickness. Now bend it into required shape by straps and clamps. When got into position by force, leave it for 24 hours or longer and then keep it aside for another 48 hours before any attempt to work it. Care should be taken to compress the inner curves rather than to stretch the outer ones. The first cut from the lower end of the tree gives the best kind of wood for bending; it should be straight-grained, young, and not too fully seasoned. A simple bend can be made with a rigid iron former, shaped like a link from a chain, or a thick plate of iron having a hole in it through which the piece of wood that has to be bent can be passed. The sides of the hole are bevelled off to soften the abruptness of a right angle, and the ends of the wood are then clamped down to the flat surface of the plate and kept there till the suppleness and elasticity imparted by boiling has disappeared and the wood retains its altered shape.

JAGGERY MAKING FROM SUGARCANE JUICE

1328 A.A.W., Vaniyambadi — Desires to learn a process of making jaggery from sugarcane juice.

Gur is a compost of sugar crystals and molasses prepared by boiling cane juice with or without clarification and concentrating it to almost solidifying point. To begin with the cane is crushed in a 3-roller iron crusher. The juice so extracted is trained through a cloth and put into the boiling pan. Here the juice is boiled. The scum will soon begin to rise on the surface and a hissing sound produced and upto this stage juice in the pan must not be disturbed in any way. As soon as this sound ceases to be perceptible the vegetable defecant is poured in all at once. The quantity of this material required may be judged by the boiler. The defecant generally used is prepared by pounding in water the green stems of the wild deola (Hibiscus Ficaleneus), or bhindi. (Lady's Finger).

The scum which is dark green in colour rises to the surface of juice undergoing clarification followed, if clarification is complete, by an absolutely white froth. If however the froth is not quite white the inference should be that the liquor requires a further dose of the vegetable defecant, which should be added, though sparingly till white froth begins to come up to the surface. Meanwhile the scum should be removed with the ladle, a round perforated disc of iron to which an iron handle is rivetted, and thrown with the same instrument on to a cloth or woollen placed on a bamboo or wicker-work basket to serve as a filter, any liquor which goes with the scum being caught in a suitable receptacle placed below the filter.

When all the scum has been removed the white froth (chandoi) will continue to come up to the surface. At this stage a solution of pink sajji (a mixture of crude sodium carbonate and some sulphur salt not actually determined which is much weaker in action than the commercial carbonate or bicarbonate) should be poured into the boiling liquor in moderate quantity. With the evolution of the carbonic acid gas as a result of combination of the sodium with the organic acids present in the juice, an abundance of froth, which seems to consist chiefly of gummy matter contained in the liquor, then

comes up violently to the surface. The sulphur salt also decomposes and the sulphurous gas evolved, which is readily perceptible to the smell exercises a mild bleaching action on the liquor. It is for this reason that the solution of sajji is preferable to the carbonate or bicarbonate which contains no sulphur.

When the juice is sufficiently concentrated, the feeding of the furnace with fuel should be stopped and the charge in the concentrator should be stirred violently with the wooden instrument known as ghotna. The continuous movement of the liquid round and round keeps the temperature of the pan fairly uniform and burning. The right condition or consistency at which to discharge a pan is judged by the experienced eye and the temperature of the mass is somewhere about 118°C.

When the pan is removed from the oven, the contents of it are ladled out on the unbaked round earthen vessel known as chak on which the mass is allowed to cool. Then the boiled mass lying on the chak, having cooled down somewhat, it should be turned over with a wooden scraper until the mass assumes a spongy appearance when it should be made into a round or conical heap and left to cool further it may be poured into earthen jars and left to crystallise. Portions may then be sliced off the cheap and made into cakes of the special shape as fancied by the consumer, usually balls about ½ seer each in weight.

FRUIT WINES

1350 B.T., Shillong—Wants to have a process of making fruit wines.

The juice of various fruits, such as oranges, black plum, pomegranates, grapes, apples, pears, etc., and also that of mahua flower, sugarcane and date palm may be fermented to make good palatable wines.

Before pressing out the juice, the fruits are washed and cut in pieces and then crushed in a fruit chopper. An ordinary meat grinder may be used for the purpose. The pomace is then pressed out by a screw press or a hand press. To this juice must be added the yeast for fermentation.

The juice should be pressed from ripe fruits and then allowed to ferment spontaneously in barrels. Compressed yeast cakes may be used to advantage. A little sugar may be added if the total solid of the juice is less than 15 per cent.

In order to get a better result, alcoholic fermentation may be induced by pure yeast culture collected from some source and grown as a pure yeast culture for the purpose. Compressed yeast cakes, which are sold in the market in small packets, may also be used to advantage. The cubic centimetre of yeast for every 20 seers of juice will give a satisfactory result.

When the fermentation stops and the sugar in the juice has fermented the barrels are covered with a wooden top. In order to ensure success some wine should be added in the fermented juice, as it prevents the vinegar formation. The barrel should be opened every day and the liquid examined, and if there be any sign of vinification more wine should be added. The barrel should always be kept full and closed air-tight.

When fermented liquid has settled for about a month, the liquid should be drawn off into another barrel closed tight. If desired, large bottles may be used for the purpose with cork on top. The barrels or bottles containing the wine should be stored away at least for a year. This process is called "ageing". Unless the wine is aged, it is not pleasing to the taste and is flavourless. Care must be taken to see that the containers are full and closed tightly. During this ageing period the flavour of the wine develops by a process of slow oxidation. Before bottling, the wine should be filtered if it is not clear enough and then bottled and corked. It is better to dip the neck of the bottles in melting paraffin or sealing wax.

CURING ANIMAL SKINS

1355 B.C.G., Panchapalli—Wishes to know a method of curing animal skins with hair on.

Stretch the skin and tack it tightly on a board; scrape off all the fat with a blunt knife, and also remove as much of the congealed blood as possible. Now soak a rag with strong acetic (33 p.c. but no stronger) acid and rub it well into the skin, going into every nook and corner, set aside to dry for one or two days, then repeat the acid dressing. When this second dressing is thoroughly dry, apply a 10 per cent. solution of ammonium sulphate with a good-sized paint brush, and apply similarly a 10 per cent. solution of washing soda. The ammonia then liberated slowly neutralises the acetic acid in the skin. This process is repeated the next day, and then after two days, the skin is rinsed, under the tap, while still tacked on the board, using the hand to cause the water to penetrate. Set aside to drain, and then dry slowly in a warm room, but not against the fire. Finally when dry, rub well with either benzoated lard or linseed oil.

—BRIEF QUERIES AND REPLIES

Questions of any kind within the scope of Industry are invited. Enquiries or replies from our experts will be published free of charge in serial order. Questions are replied by post on receipt of As. 8 stamps for each question. Subscribers outside India are requested to send two International Reply coupons for each question. In order to facilitate the work of Editor's Department and to help prompt action the readers are requested to send enquiries in separate letters.

1655 B.I.M.B., Ludhiana — For technical and engineering books enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East; W. Newman & Co. Ltd., 3 & 4, Old Court House Street and Das Gupta & Co., 54/3, College Street; all of Calcutta.

1658 P.S.P Coimbatore — Reply to your letter has been sent by post.

1659 M.P.Y., Mergui — For small oil crushing rotary machine enquire of Girish Chandra Bysack & Co., 236, Upper Circular Road, Calcutta.

1660 G.I., Jullundur City — Formulas of boot polish will be found in April 1950 issue of Industry. For chemical analysis you may enquire of Industrial Research Laboratory, 22, R. G. Kar Road, Calcutta.

1662 G.B., Gorakhpur — Plastic machines may be had of Francis Klein & Co. Ltd., 1, Royal Exchange Place and Small Machineries Mfg. Co., 22, R. G. Kar Road; both of Calcutta. For fountain pen engraving machine enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

1663 L.S.R., Balasore — For dyes enquire of Bengal Chemical Colour Co., 38, Armenian Street; East Indian Colour Co., 34, Armenian Street and Hansraj Vishram & Co., 2A, Armenian Street; all of Calcutta.

1664 C.S.V., Kumbakonam — Following is a formula of slate pencil: Powdered slate 60 parts; powdered limestone 30 parts; sodium silicate 10 parts. Knead together all the ingredients to form a plastic mass and then force through metallic tubes of suitable diameter fitted with pistons. Afterwards cut off into small lengths and bake over a slow fire.

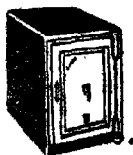
1665 S.A.H., Ahmedabad — The formula of spirit solution used for adhesive will appear in Formula Section in due course.

1666 P.A.R., Vizianagram—You may manufacture ice candies of various colour as prepared and poured in the mould in the refrigerator for freezing.

1667 K.C.D.S., Alwaye — The first process in malt making is to steep the grain for 2 or 3 days or more in water containing in a stone cistern. The grain imbibes moisture and swells, carbonic acid gas is given off, some of the husk or skin dissolves and the grain becomes softer and whiter. According to the quality of the grain the weight increases by steeping as little sometimes as 10 per cent as much in other instances as 80 per cent. On removing from the cistern, the steeped grain is thrown on the floor in a heap and remains in that condition for a considerable time. It undergoes sweating process. It gives off moisture, increases in temperature, feels warm and moist to the hand exhales an odour as that of apples, and begins to germinate at the extremity of each grain. At a certain stage of the sweating process the germinated grain is shovelled down and spread in a thin layer on the floor, and frequently turned. It absorbs oxygen from air, readily gives off carbonic acid, increases in warmth and an evident change takes place in the meal or starch within the husk. The grain is then allowed to dry which is usually performed in a kiln. It is like a room kept heated by hot air ascending through holes in the floor from a furnace below: The malt is spread over the floor, and is gradually raised to a temperature of 120° or 140°F. It is chiefly on the management of this process that depends the classification of the resulting malt. The malt is then reduced to fine powder favourable for subsequent operations.

1668 K.P.E.C., Jamnagar — Process of tin printing will appear in Formula Section in due course.

1669 K.S.C., Midnapore — You may start ink manufacture with Rs. 1000/-. Process of ink manufacturing will be found in April 1950 issue of Industry.

1670 T.K.K., Madanapalle — Rubber goods may be had of Bengal Waterproof Works Ltd., 32, Theatre Road, Calcutta and Bhattacharjee Rubber Works, 174, Jessore Road, Dum Dum, Near Calcutta. For cut pieces enquire of Anandaram Gajadhar, 1, Noormul Lohia Lane; Bhurmal Debidutt, 198, Cross Street; Hookum Chand Jaskaran, 30, Cotton Street and Banwarilal Lath, 48, Cross Street; all of Calcutta. Wants to be put in touch with the suppliers of enamel photos.

[illegible] N.R.J.C., Indore — Following is a list of millstore dealers: British Mill Stores Co., Sir Vithaldas Chambers, Bruce Street, Bombay; India Machinery Stores, 168, Nagdevi Cross Lane, Bombay 3 and Bengal Engineering Co., 12, Dalhousie Square, Calcutta.

1672 N.I.M.C., Bhavnagar — For zinc sheets write to Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta.

1673 S.R.R., Muzafferpur — You may start bucket making, rubber nipples, baloons and other seamless goods.

1674 C.R.S., Madras—Process of manufacturing slate pencil will be found under No. 1664 above.

1678 D.D.T.C., Bhopal—For natural magnet enquire of Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane, Calcutta and Scientific Instrument Co. Ltd., 11, Esplanade East, Calcutta.

1679 J.V., Shikohabad—Paraffin wax may be had of Burmah Shell Oil Storage & Distributing Co. Ltd., Hongkong House, Dalhousie Square, Calcutta. For printed tin cans write to Metal Box Co. of India Ltd., B2, Hide Road, Calcutta and National Sheet & Metal Works Ltd., 36A, Sahitya Parishad Street, Calcutta.

1680 B.R.B., Rohtak—You may start manufacture of casein with Rs. 5000/-. In this connection you may consult Milk and Milk Products published from this office, price Rs. 3/7/- including postage.

1681 D.N.D., Mathura—In manufacturing camphor you should use pure turpentine oil, if the oil is adulterated you will not get camphor. Commercial nitre generally contains chlorides, sulphates, or calcareous salts. The first may be detected by its solution giving cloudy white precipitate with nitrate of silver; the second by chlorides of barium or calcium giving a white precipitate and the third by oxalate of ammonium giving a white precipitate. Chemicals for liquid gold may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta.

1682 G.L.K., Banaras—Plastic machine and dies may be had of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta and Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

1683 V.K.S., Mehekar—Process of manufacturing phenyle will be found in April 1950 issue of Industry. Creosote oil, cresol etc. may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta. For complete saponification of groundnut and linseed oil you should boil longer.

1686 E.I.C., Bangalore City—Following is a formula of liquid gum. Gum arabic 10 parts; starch 10 parts; sugar [illegible] parts; boiling water 100 parts; salicylic acid [illegible] parts. Dissolve the gum arabic in half the quantity of boiling water and then mix the starch and sugar and finally add the remaining boiling water and salicylic acid.

1687 A.P.S., Cocanada—Process of manufacturing cellulose products will appear in Formula Section in due course.

1688 C.J.D., Kolhapur—Following is a list of firework manufacturers: Orient Fireworks Co., 175, Upper Circular Road, Calcutta and Bonbonniere, P. O. Box 10827, Calcutta. Following is a list of tea merchants: A Lookmanji & Co., 20, Pollock Street; Abbas Tea Co., 30, Lower Chitpur Road; Chandumall Bhatia, 7, Canning Street; Chhaganlal Kastur Chand, 9, Netaji Subhas Road; Dilaver Khan Rahim Khan Co. Ltd., 12, Amratola Street and F. Gangjee & Co., 24, Mission Row Extension; all of Calcutta.

1689 B.R.T., Ratangar—For Alexander sewing thread write to Bablin & Co., Post Box 1611, Cathness Hall, Linghi Chetty Street, Madras 1.

1690 P.C.N., Ambala Cantt.—You may negotiate with the following firms for taking agency: Alembic Chemical Works Co. Ltd., Laxmi Insurance Bldg., Sir P. Mehta Road, Fort, Bombay; Bengal Chemical & Pharmaceutical Works Ltd., 164, Manicktala Main Road, Calcutta; Calcutta Chemical Co. Ltd., 35, Panditia Road, Ballygunj, Calcutta; Butto Kristo Paul & Co. Ltd., 1 & 3, Bonfield Lane, Calcutta and Lister Antiseptic & Dressing Co. (1928) Ltd., 12, Umakanto Sen Lane, Calcutta.

1692 K.S.R., Kakinada—Duplicators may be had of J. J. Shah & Sons, 354, Kalbadevi Road, Kalyan Bhavan, Bombay and Kapur Duplicator Mfg. Co., Banska Phatak, Banaras. Other accessories may be had of the above firms.

1693 Y.V., Nellore—Process of manufacturing camphor tablets will appear in Formula Section in due course.

1694 S.K.S., Ranchi—Process of manufacturing egg powder will appear in Formula Section in due course.

1695 R.T.C., Guntur—Address of Bengal Potteries Ltd. is 45, Tangra Road, Calcutta.

1697 K.S.W., Ajmer—Chicle gum is not available in India. You may use gum tragacanth and gelatin in place of chicle gum.

1698 A.C.W., Mainpuri—Tablet making machine may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. Ink pots may be had of Bejaya Glass Depot, 4, Jackson Lane and Ananta Kumar Ghosh & Co., 9, Ezra Street; both of Calcutta. Printed tin corks and sheets

...y be had of National Sheet & Metal Works ...td., 18A, Sahitya Parishad Street, Calcutta and ...etal Box Co. of (India) Ltd., B2, Hide Road, ...idderpur, Calcutta. For quick drying of ink ...ou may add spirit.

1700 R.N.S., Poona City—Refer your query ...the publisher of the book.

1701 S.S.S.C., Calcutta—Process of galvanis...ng steel articles will appear in Formula Section ...n due course.

1702 V.R., Nuzvid—You may consult ...anufacture of Ink and Manufacture of ...onfectionery both the books published from ...his office, price Rs. 3/7/- each including postage. ...or machines write to Small Machineries Mfg. ...o., 22, R. G. Kar Road, Calcutta and Oriental ...lachinery Supplying Agency Ltd., P12, Mission ...ow Extension, Calcutta.

1703 K.C.W., Agra—Moulding powder is ...ot manufactured in India at present. Formula ...f cement for joining plastics will appear in ...ormula Section in due course.

1706 H.K., New Jatoi—A good formula of ...ulwa appeared in August 1950 issue of Industry.

1707 C.A., Imphal—You may consult ...egetable Oil Industry published from this ...ffice, price Rs. 3/7/- including postage.

1708 C.M., Bulandshahr—For Derby Lottery ...ickets enquire of Royal Calcutta Turf Club, 13, ...ussell Street, Calcutta.

1710 N.U., Lucknow—Following is the ...rocess of manufacturing steel slate: First ...repare the silicate solution by finely crushing ...qual parts of solid potash and soda silicate and ...ouring over this 6 times the quantity of soft ...iver water which is kept boiling for about 1½ ...ours, whereby the silicate is completely ...issolved. Next take 7 parts of slate finely ...owdered and mix with 1 part lamp black. ...rind enough of this mass with the previously ...repared silicate solution as is necessary for a ...hick or thin coating. With this compound ...ough steel plates are painted uniformly and ...llowed to set.

1711 G.L.S., Srinagar—Process of making ...iquor ammonia will appear in Formula Section in due course.

1712 S.B.C.M.L., Ajmer—All damaged wire cannot be enamelled again to be used in motor and regulators. For wire drawing machine enquire of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta.

1713 A.A.G., Dhrapha—Following is a formula of bindi: Gum arabic 10 oz.; carmine 15 oz.; rose water 16 oz.; distilled water 1 quart. Macerate the first two ingredients in a stone mortar with sufficient rose water to make into a thin paste. Then put up in phials for use. In manufacturing bindi you should not use congo red in place of carmine. You may use tank water in place of distilled water if it is not available.

1717 B.M., Goalpara—Refer your query to Calcutta Chemical Co. Ltd., 10, Bonfield Lane and Butto Kristo Paul & Co. Ltd., 1 & 3, Bonfield Lane; both of Calcutta.

1719 E.I., New Delhi—For book on rubber latex enquire of Thacker Spink & Co. (1933), Ltd., 3, Esplanade East, Calcutta.

1720 I.H.R.S.C., Choharpur—For raw materials enquire of Calcutta Chemical Co. Ltd., 10, Bonfield Lane and Butto Kristo Paul & Co. Ltd., 1 & 3, Bonfield Lane; both of Calcutta. You may try Bombay Market, 21, Dadyseth Agiary Lane, Bombay.

1721 N.S., Sivakasi—For wiring clip making machine enquire of Alfred Herbert (India), Limited. 13-3, Strand Road, and Francis Klein & Co., Ltd., 1, Royal Exchange Place; both of Calcutta.

1723 E.B.W., Quilon—For turmeric, gamboge and dragon's blood enquire of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta.

1724 H.N.M., Bombay—The foam producers are made from saponin. The saponin is obtained by exhausting soap bark, soap root and soap nuts with water. The albuminoids in the solution are then precipitated by means of formaldehyde and the clear solution is evaporated to dryness in a vacuum. The resulting product is a very hygroscopic powder which is strongly sternutatory and which must be kept in well stoppered bottles, as otherwise it conglutinates to form difficultly soluble lumps. The simplest foam extract consists of a solution of 1 part saponin in 9 parts hot water, which is filtered if necessary, and rendered stable by addition of 1 per cent. sodium benzoate.

1725 R.D.S., Ganjam—For selling the articles you deal in advertise in newspapers as it is very difficult to suggest names of buyers of goods you deal in.

1726 M.M.S., Delhi—For DDT and pyrethrum extract enquire of Butto Kristo Paul & Co., Ltd., 1 & 3, Bonfield Lane and Bengal Chemical & Pharmaceutical Works, Ltd., 164, Manicktala Main Road; both of Calcutta.

1728 E.T.C., Bangalore City—For asbestos you may enquire of Harkarandass Mangilall, Chaibassa.

1729 N.A.C., Ranchi—Venice turpentine, potasium carbonate and activated charcoal may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta.

1731 M.A.C., Allahabad—Refer your query to the High Commissioner for India, India House, Aldwych, London W. C. 2.

1732 N.P.C., Kistna—Addresses of Belgium and Czechoslovakia are not available. You may however enquire of Consul-General for Belgium 4/1A, Alipore Road, Alipore, Calcutta and Consul-General for Czechoslovakia, West View, 17, Wodehouse Road, Colaba, Bombay.

1733 N.B.S.R., Ballab-garh—Process of refining crude saltpetre will appear in Formula Section in due course.

1734 *C.I., Delhi—Reply to your letter has* been sent by post.

1735 R.S., Agra—A good recipe of drakshasava will appear in due course.

1736 Z.A., Karachi—We have no chemical encyclopoedia. You may however enquire of W. Newman & Co. Ltd., 3 & 4, Old Court House Street, Calcutta.

1737 N.U., Lucknow—A good formula of rubber solution appeared in March 1950 issue of Industry.

1738 H.N.G.S., Bilaspur — Soda water machines may be had of Essence & Bottle Supply Agency, 14, Radha Bazar Street and Orient Traders, 5, Ezra Street; both of Calcutta.

1741 J.D.E., Pasumalai—You may consult Manufacture of Soap published from this office, price Rs. 4/7/- including postage. We have no book on laundry.

1742 C.R.P.R., Sirsa—Process of refining and deodorising all sorts of vegetable oils will be found in Vegetable Oil Industry published from this office, price Rs. 3/7/- including postage.

1743 R.M.D., Khallikote—For guns and material you may enquire of A. C. Coondoo & Co., 170, Dharamtala Street; D. N. Biswas & Co., Dalhousie Square East; Manton & Co. Ltd., 13, Old Court House Street and K. C. Biswas & Co., 1, Chowringhee Road; all of Calcutta.

1745 C.N.N., Karur—Tamil equivalent of Adhatoda Vasica is Adatodai and Malayalam equivalent is Ataloetakam.

1748 A.A., Jodhpur—Following is a list of plastic goods manufacturers: Bake-o-Brass Ltd., Old Atlas Mills Compound, Reay Road, Mazagaon, Bombay 10; Bestolite Moulding Co. of India Ltd., Asian Bldg., Ballard Estate, Bombay; Indolite Manufacturing Co., Ltd., Near Power House, Bhavnagar, Kathiawar; India Moulding Co., C2, Bharat Bhavan, 13, Chittaranjan Avenue, Calcutta and Swadeshi Industries Ltd., Jaipuria House, 132, Vivekanada Road, Calcutta.

1749 N.S.H., Madras—You may consult Plastic Industry published from this office, price Re. 1/7/- including postage.

1751 C.A.F.S., Iringa—For taking agency you may negotiate with Bengal Chemical & Pharmaceutical Works Ltd., 164, Manicktala Main Road; Calcutta Chemical Co. Ltd., 35, Pandittya Road, Ballygunge and Bengal Immunity Co. Ltd., 153, Dharamtala Street; all of Calcutta.

1752 A.C.W., Gurgaon—Neem oil is extracted from neem seeds by means of a country ghanny. Wants to be put in touch with the manufacturers and suppliers of neem oil.

1753 S.P.R., Eluru—Process of manufacturing wax paper, precipitated chalk, etc. will appear in Formula section in due course.

1756 M.B., Upleta—Process of manufacturing Singapuri catechu will appear in due course.

1757 H.L., Calcutta—Following is a list of homeopathic journals: Hahnemaner Banee, 162, Bowbazar Street; Homeo Journal, 60, Simla Street; Homeopathic Bulletin, 3-2, College St.; Homeopathic Darpan, 172, Bowbazar Street and Homeopathic Mirror, 175, Bowbazar Street; all of Calcutta.

1760 F.S., Kohima—For Lux and Lifebuoy soap write to Lever Bros. (India) Ltd., 9, Lyons Range, Calcutta. For leather and rubber shoes for ladies enquire of Central Rubber Works Ltd., 20B, Tangra Road; National Factory, 81, Bentinck Street and Sadake Shoe Factory, 24, Lower Chitpur Road; all of Calcutta. Stationery goods may be had of Nilmoney Halder & Co., 11, Chittaranjan Avenue South and Satya Charan Banerjee & Co. Ltd., 14/2, Old China Bazar Street; both of Calcutta.

1761 H.C.K.C., Delhi—Process of manufacturing liquid white canvas shoe dressing will appear in due course.

1766 R.S.S., Bassi — You may consult Small Industries published from this office, price Re. 1/15/- including postage.

1768 T.V., Janagaon—It is not possible to manufacture gold from mercury. There is no arrangement for giving practical training in dye manufacture.

1772 J.G.S., Delhi—Please write in English.

1775 R.K.M.S., Kanpur—There is no such institution where training is given by correspondence for Senior Cambridge examination.

1776 L.B.C., Patna City—For waxing and printing packing paper write to Symposium Publicity and Propaganda Service, 22, R. G. Kar Road, Calcutta.

1779 S.V.C., Calcutta—Refer your query to Signograph Co., Baranagore, near Calcutta.

1780 A.V., Coimbatore—Materials for precision casting process may be had of Alfred Herbert (India), Ltd., 13-3, Strand Road and Francis Klein & Co., Ltd., 1, Royal Exchange Place; both of Calcutta.

1781 V.N.G., Lucknow—Refer your query to the Government of India, Education Ministries, New Delhi.

[illegible] K.K.A., Garhwal—For DDT powder enquire of Butto Kristo Paul & Co. Ltd., 1 & 3, Bonfield Lane, Calcutta. Process of manufacturing DDT lotion appears in September, 1950, issue of Industry. Hard paraffin may be had of Burmah Shell Oil Storage & Distributing Co. Limited, Hongkong House, Dalhousie Square, Calcutta.

1784 K.D.S., Katmandu—Following is a formula of adhesive for cellulose: Glue 20 parts; water 20 parts; acetic acid (30 p.c.) 40 parts; potassium bichromate 1 part. This chromate glue must be stored in total darkness. Formulas you require will appear in due course.

1785 P.V.R., Vizagapatam—For hearing apparatus enquire of Butto Kristo Paul & Co., Ltd., 1 & 3, Bonfield Lane, Calcutta.

1786 A.M.A.R.R., Pudukottai—You should advertise in newspapers for a chemist who will help you in manufacturing ultramarine blue. We are not aware of any such chemist.

1789 B.R.C., Aligarh—For nickel sulphate and nickel chloride enquire of Alfred Herbert (India) Ltd., 13/3, Strand Road and Imperial Chemical Industries (India), Ltd., 18, Strand Road; both of Calcutta. For nickel write to Gopal Chandra Dass & Co., 23, Raja Woodmunt Street, Calcutta.

1790 C.S.B., Banhatti—For oils you may write to Ahmed Oomerbhoy, Two Tanks, Grant Road, Bombay and Mohmedi Oil Mills, Dongrijai Road, Narsingpura, Bombay. For soap chemicals and colour write to Shoorji Vallabhdas Colour Co., 280, Samuel Street, Vadgadi, Bombay 3. and Odhavji Devidas, 357A, Vakil Bldg., Samuel Street, Vadgadi, Bombay.

1793 V.C.C., Agra—Following is a formula of gripe water: spirit ammon co 3 dr.; potash bicarbonate 1 oz.; simple syrup 32 oz.; aqua caraway concentrated 1 oz.; aqua anise concentrated 1 oz.; aqua anethi concentrated 2 oz.; distilled water 4 oz. Dissolve all the ingredients in the distilled water one by one.

1796 K.V., Kayts—For books on handloom weaving enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East and W. Newman & Co., Ltd., 3, Old Court House Street; both of Calcutta.

1797 R.H., Asvari — For homeopathic degree write to International Institute, Aligarh and Regal College of Physicians, 39, Neogipukur Lane, Calcutta.

1800 M.L.S., Jullundur City—You may go through Plastic Industry published from this office, price Re. 1-7 including postage. Machines may be had of Francis Klein & Company, Ltd., 1, Royal Exchange Place, Calcutta and Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. Raw materials may be had of Imperial Chemical Industries (India) Ltd., 18, Strand Road, Calcutta.

1801 G.G.W., Balawali—It is not possible to manufacture needles on small scale as home industry basis. As far as we know needles are not manufactured in India at present.

1802 S.C.D.P., Saktipur — You may use saccharin as sugar substitute. You may take up manufacture of lozenges, chalk stick, slate pencils, etc. These industries have good prospect. For increasing your height you should contact a physical instructor.

1803 V.K.G., Vizagapatam — For salting syringe enquire Medico Scientific Stores, 30, Colootola Street, Calcutta.

1805 J.P.P., Mandla—For anatomical and physiological chart enquire of the following firms: Medico Scientific Stores, 30, Colootola Street; Das Gupta & Co., 54-3, College Street and Standard Literature Co. Ltd., 13/1, Old Court House Street; all of Calcutta.

1807 P.C., Delhi—Formulas of chewing gum and synthetic camphor will appear in Formula Section in an early issue of Industry.

1808 A.T.S., Ahmedabad—For plastic goods enquire of the following firms: Basak Brothers, 20, Raja Manindra Street; Basanti Plastic Industries, 22-A, Anath Nath Deb Lane and Plastic Moulders Ltd., 38, Netaji Subhas Road; all of Calcutta.

1811 N.C.I., Karur—Vermicelli making machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

1812 B.C.A., Ajmer — For glass mould enquire of Edison Power Plant Co. Ltd., 34, Ezra Street, Calcutta.

1814 P.G.S., Jullundur City — Treat the rubber goods at 100°C.

1816 J.R.K., Ludhiana—Process of manufacturing transfer will appear in Formula Section in an early issue of Industry.

1818 B.K.D., Cachar—We are not aware of the addresses of tea gardens in S. Africa.

1819 C.L.M., Sambalpur—We have no book on hosiery business. You may however enquire of Standard Literature Co. Ltd., 13/1, Old Court House Street, Calcutta for the book. You may consult How To Do Business published from this office. You may start an electrical shop in your place.

1820 H.S., Bombay—One type of cement containing shellac is made by dissolving 12 parts white gum in 6 parts of water. After mixing add 2 parts shellac varnish. You may use spirit as solvent for gasket shellac.

1821 G.H., Jabalpur—Following is a formula of vinegar of sugar cane: Take 10 seers of sugarcane juice in an earthenware vessel and bring to a boil. Remove when it bubbles off and strain when cool. Put it into an earthen vessel. Cover the mouth and bury the same in the ground. The hole should be dug big enough to hide the vessel upto the neck. After some days a film will appear, remove it and cover again. Repeat this process so long as films are formed. Lastly when this ceases, strain and bottle. In case of jamun fruit you should apply this process.

1822 P.T., Johore—Formulas of bird catching paste, etc. will appear in Formula Section in an early issue of Industry.

1823 T.C.M., Coimbatore—Fretwork tools may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

1824 R.I.W., Nagercoil — For thermometer write to Adair Dutt & Co. Ltd., Stephen House, 4, Dalhousie Square, Calcutta and Lawrence & Mayo (India) Ltd., 11, Government Place East, Calcutta. Sugar crushing machines may be had of Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta.

1825 S.H.B.S., Ahmedabad — Process of manufacturing disinfectants appeared in April, 1950, issue of Industry.

1826 H.K., New Jatoi—Process of manufacturing rectified spirit, vinegar, yeast, etc. will appear in Formula Section in due course.

1827 S.R.M., Bijapur—In order to prevent lrying of gum you may use glycerine.

1828 S.L., Akola—To communicate with any advertiser write him with number care of Industry when your letter will be duly redirected.

1829 W.G.F., Hinganghat — You may use lime for preserving neera. You may also refer your query to the All India Village Industries Association, Wardha, M.P.

1830 P.R.K., Atmakur—We have no book on peppermint manufacture.

1831 N.P.N., Nagercoil — No easy process of rating coir is available.

1832 H.P.M.P., Bijnor—World directory may be had of Thacker Spink & Co. (1933) Ltd., , Esplanade East, Calcutta.

1833 S.K.S., Khurda—You may experiment the soap on small quantity. Scent should be added to the soap before framing.

1834 S.B., Bikaner—Repeated use of amla il will make the hair black. You should ncrease the proportion of nitre to remove the efect of dhoop. You may write to W. H. Brady t Co., Ltd., Church Gate St., Fort, Bombay for wool sorting machine. A formula of compound for perfuming oil appeared in July, 1950, ssue of Industry. Following is a list of inema Film producers: Ajit Pictures, Main Road, Dadar, Bombay; Bombay Talkies Ltd., eady Money Mansion, Churchgate Street, Fort, ombay; Jyoti Studios, Kennedy Bridge, Bombay 7; Aurora Film Corporation, 125, Dhurramtolla Street, Calcutta; Kali Films, 4, Baburam hosh Road, Tollygunge, Calcutta, and New heatres Ltd., 172, Dharmatalla Street, Calcutta. Following is a list of glass factories: ree Govinda Glass Works, Ramrajatola, owrah; Sodepur Glass Works, Sodepur; harat Glass Works Ltd., Belgharia; Calcutta lass & Silicate Works, 9, Kundu Lane, Calcutta nd Victoria Glass Works, 130, Mechua Bazar treet, Calcutta.

1835 P.C.A., [illegible] pow may be had of Imperial Chemical Industr (India) Ltd., 18, Strand Road, Calcutta.

1836 S.L.K., Jullundur City—[illegible] ent of the ingredients are not available. A the ingredients may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta.

1837 S.D., Calcutta—Process of manufacturing cork board will appear in Formula Section in due course.

1838 A.N.M., Calcutta — For automatic spinning machine enquire of W. H. Brady & Co. Ltd., Mercantile Bldgs., Lall Bazar, Calcutta. Addresses of Pal blade importers are not available. Wants to be put in touch with the importers of Italian and Japanese needles. Formulas of bakelite powder, paper board, etc. will appear in Formula Section in due course.

1839 S.K.A., Agra—For sweets write to Agenta Confectionery Works, Velji Kakhamsergwadi, Mazagaon, Bombay; National Confectionery Mfg. Co., 301, Cr. of Grant Road, Bombay; Paramount Confectionery Works, 81, Mamanwada Road, Bombay; C. Shantlal & Co., 744-7, Kandhi Road, Opp. Toda Pole, Ahmedabad; Sathe Biscuit & Chocolate Co. Ltd., 820, Bhawani Peth, Poona 2 and H. C. Wanger, Connaught Place, New Delhi.

1843 J.C.S.W., Hoshiarpur — You may manufacture cash boxes of various sizes from plane sheets.

1846 A.A., Jodhpur — You may consult Manufacture of Catechu published from this office, price Rs. 3/7/- including postage.

1847 H.C.V., Mandi—We have no book on handloom weaving, wool spinning, weaving and dyeing.

1848 S.H.J., Farrukhabad—Fuller's earth may be had of Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane, Calcutta.

1853 A.N.P.C., Kaveripatnam—It is not possible to manufacture mantles without cerium nitrate and beryllium nitrate.

1854 D.M.C., Patan—Vernacular equivalent of pyrethrum flowers and derries root are not available. These grow in the Nilgiris and Kashmir.

1857 U.T.C.I., Delhi—Shoe lace making machines may be had of Oriental Machinery Supplying Agency, Ltd., P-12, Mission Row Extention, Calcutta. Dyed yarn is required for making shoe lace. Tin clips are also required for attaching the two ends.

1859 P.A.S., Madras—Process of manufacturing catgut will appear in Formula Section in due course.

REVIEW OF BOOKS

DEEP SEA FISHING AS A COTTAGE INDUSTRY by U. Shanker Rao. To be available from Higginbothams, Mount Road, Madras. Pages, 97; price, Rs. 3/-.

The development of sea fishing has long been engaging the attention of the Government of India and had been a subject of reference to a Commission headed by Sir K. G. Gupta about 40 years ago. It is regrettable that upto date nothing tangible has resulted from this. Forty years ago there was hardly a deep fishing industry in South Africa, yet to-day the Union is in the fore-front of commercial fishing. Brilliant results have also been achieved in this line by China and Japan. India also should now seriously think of utilising the enormous resources of fish abounding in the coastal waters, specially because there is a terrible dearth of fish which makes fish beyond the financial reach of most of the fish-eating people of India. The author of the book under review examines the fish position in the estuaries and deep coasts, and the influence of weather and seasons on their movements and the present facilities available for refrigeration and transport. He is definitely of the opinion that deep sea fishing can be developed and operated on the lines of cottage industry, i.e. with indigenous materials and small vessel or motor boats convertible into trawlers worked by local fishermen having sound knowledge of local conditions. The book proceeds with the description of trawling operation. The author draws up a scheme for introducing motor fishing vessels and at the same time enabling our fishermen and de-mobilised naval personnel to start a fishing company on a small scale and recommends the Drifter Trawler as an all-purpose class of vessel which can be used for any kind of deep sea fishing such as long lining (Madras Coast), seiving (Malabar Coast) and drift-netting (Bombay Coast). Standardised construction and bare boat chartering of such vessels may be adopted at the beginning.

RAYON by Joseph Leeming of American Viscose Corporation. Published by Chemical Publishing Co., Inc., Brooklyn, New York, U. S. A. Pages, 203; price, $ 3.75.

Rayon is the first man-made fibre that has got wide popularity on account of its versatile properties. Though it is of recent origin it now occupies a significant position as a textile fibre and ranks only second in importance to cotton. It was first produced on a commercial scale about the year 1900 but since then the improvements have been so rapid and far-reaching that its production in recent years has reached a record figure of 2000 million lbs. annually. Large factories have been established in the Continent and the U.S.A., for manufacturing rayons of various degrees of fineness and shades of colour. The meteoric rise of the fibre to such popularity is partially due to intensive research work carried on by chemists for its improvement and partially due to the fact that it combines utility with luxury which brings the fibre within the financial reach of low-income groups. Its uniformity, its affinity for colour, the ease and economy with which rayon can be processed by textile mills, above all the great variety of new fabric effects that rayon makes possible are some of the factors that have contributed to its wide use. In addition to clothing rayon has other widely diversified uses as curtains, bedspreads, draperies, tyre cord, automobile body linings, etc., etc.

The book under review gives an interesting historical account of the series of researches made in search of synthetic fibre since the dawn of civilization right down to the present times and describes the condition leading to the discovery of viscose rayon, cuprammonium rayon and acetate rayon, the three important varieties of rayon. The book further gives, quite in a non-technical way, the various processes of their manufacture, their properties and uses, tests and present world production. The Glossary of Rayon Fabrics appended at the end of the book will be found valuable for reference purpose. In short the book offers complete information on the researches, manufacture and properties and uses of rayon and will be found useful to those interested in the subject.

CHEMICAL INDUSTRIES COMMITTEE REPORTS I, II & GENERAL REPORT. Published by the International Labour Office to be had of International Labour Office, Indian Branch, New Delhi.

The Report I is an informative document on the working and position of the chemical industries in the various countries like the United States of America, the United Kingdom, France, Germany, Italy, Canada, Belgium, etc. It collects all the facts and data which would enable the Committee when it meets next to arrive at a permanent definition of the chemical industries and prepares a draft of nomenclature together with a table of classifications by groups or by categories, chemical industries engaged in the manufacture of products included in the nomenclature. It makes a study of the facilities obtaining in these countries for vocational training e.g., apprenticeship, accelerated training courses, training of chemical assistants or laboratory assistants, etc. The subject of holiday, with Pay in the Chemical Industries, has also been discussed in relation to Right to Annual Paid Holidays, Length of Holiday, Continuity of Holidays, and so on.

...e Report under reference examines the holi... provisions of national regulations and col... ...tive agreements in operation. The Report ...so surveys the recent tendencies in and deve... ...ment of the chemical industries in the above ...mber-countries of the Chemical Industries ...mmittee of the International Labour Organi... ...tion, and contains a most informative account ...the situation of the chemical industry, coun... ...y by country. Mention has been made by way ...passing of the new products put in the market ...id of the putting into practice of new me... ...ods of production. It appears from the Re... ...rt that the United States ranks foremost in ...e chemical production, having to its credit ...) per cent. or more of the total output of ...veral basic chemical industries. Pages 176.

The Report II. is restricted to a study of ...nditions as prevailing in those countries so ...r as safety and hygiene in the chemical in... ...ustries are concerned. The Report contains a ...hedule of special code of regulations for the ...emical industries in various countries but it ...regrettable that no details could be obtained ...ith regard to training and education as means ...f promoting safety. A table of common hazard... ...us chemicals has been given in this connec... ...on. The Report also deals elaborately the ...arious problems of hygiene and the risks to ...ealth which take many forms, and consider ...any chemical products giving an analysis of ...he preparation of these products, the dangers ...nvolved and the individual preventive mea... ...ures taken or recommended. A short sum... ...mary is given of health risks in the main bran... ...hes of the chemical industries, e.g., alkaline ...yes, acids, bichromate, cyanides, carbide, ex... ...losives, matches, alcohols, aromatic chemicals, ...yes, plastics, insecticides, etc., etc. The price ...f this volume is Rs. 2. Pages 84.

Record of the First Session of the Chemi... ...al Industries Committee is another volume ...which will be of interest to manufacturers of ...hemicals. It furnishes a reliable account of ...he working at the first session of the Com... ...mittee, and deals with the functions of the Com... ...mittee personnel, rules of procedure for Indus... ...rial Committees, etc. This part consists of 223 ...ages and is priced at Rs. 5.

NOTICES & REVIEWS

(Manufacturers sending specimens and samples of their products for notice and review may please note that no notice is published of medical preparation and allied substances in this section.)

INCOME-TAX LAW JOURNAL

We have received a copy of International Income-tax Law Journal, April, 1950 issue. This journal is devoted to income-tax law in India, Pakistan, Burma, Ceylon, United Kingdom, Canada, Australia, U.S.A., France, U.S.S.R. etc. The present issue contains several informative articles, such as Income Tax in the U.S.S.R., Evasion of taxes in Japan, Taxation & International Trade, etc. It is published from Chandni Chowk, Kucha Brijnath, Delhi. Its annual subscription is Rs. 36/-.

NAME PLATES

We are glad to receive from Bulla, 73, Colootola Street, Calcutta 1, one embossed Hindi plate of good design.

A BOOKLET ON FAST DYE FROM RESORCIN

We are glad to receive a copy of booklet "Fast Dye From Resorcin," by A. H. Choudhury. This booklet deals with the processes of manufacturing fast dye from resorcin, catechu brown, hematin black, etc. by the author from indigenous raw materials. It is available from the author, 6/1, Mistri Para Lane, Entally, Calcutta. Its price is Annas Eight only.

SRIMAD BHAGAVATA-GITA

A copy of Srimad Bhagavata-Gita translated by Swami Vireswarananda has been received in our office. The special feature of the volume is that besides giving the full text of the Gita in Sanskrit script and their plain English meaning, this contains an English translation of the commentary made on the subject by the famous commentator Sridhar Swami. The book being written in a simple and charming style can be followed easily by all. Those who could not so long read the original Subodhini, as the commentary is called, will now have the opportunity to do this. The publishers of the book Ram Krishna Math (Mylapur, Madras, 4) have thus rendered a distinctive service to lovers of religious books. The book contains 536 pages and is priced at Rs. 7.

TRADE ENQUIRIES

(To communicate with any party write to him direct with name and address given below mentioning Industry).

1618 D.S., Subbanna, Sukravar Santhe P.O., Via Saklaspur, Hassan—Wants to be put in touch with the dealers in Mysore cardamom and honey.

1623 O. A. S. Gilani, 4B, Short Street, Calcutta—Wants to be put in touch with the manufacturers or importers of steel disc wheels with solid ½" thick rubber tyres, size of wheels 6", 8", 10" diameter.

1636 C. L. Gulati, 73, Hardinge Avenue Camp, New Delhi—Want to be put in touch with the suppliers of porquipine quils, crow quils and all sorts of feather.

1640 Kohinoor Trading Co., Outside Agra Gate, Ajmer—Want to be put in touch with the suppliers of eggs, paper garlands, etc.

1809 V. Abdul Salam Sahib, 284, P. K. Khader Hussain Saib Street, Periyapet, Vaniyambadi, N. Arcot—Wants to be put in touch with the firms interested in all sorts of date and kora mats and coconut brooms in foreign countries.

1840 Provision Supply Co., Ramtirth, Belgaum—Want to be introduced to sago factories of Madras and Kanpur.

1842 K.M., Sundara Murthy, Bazar Road, Bowringpet—Wants to be put in touch with the dealers in white wax paper in Madras and S. India.

Edited, Printed & Published by K. N. Banerjee, for Industry Publishers Ltd., at the "INDUSTRY PRESS," 22, R. G. Kar Road, Calcutta-4.
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EDITORIAL CONTENTS FOR
NOVEMBER, 1950

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Advertisement rates for ordinary and special position, both casual or contractual, are sent on request.

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All enquiries regarding industrial or business information should be addressed to the Editor. Contributions and articles for review and notice should also be sent to him.
All enquiries regarding the Subscription or Advertisement Departments should be addressed to the General Manager.

OFFICE HOURS.

Editorial Department. 11 A.M. to 4 P.M. on weekdays and 11 A.M. to 1 P.M. on Saturdays.
Subscription and Advertisement Department. 10 A.M. to 5 P.M. on weekdays and 10 A.M. to 2 P.M. on Saturdays.

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EDITOR:
K. N. BANERJEE

VOL. XLI. CALCUTTA, NOVEMBER, 1950. No. 488.

FOOD RESEARCH

THIS year already saw the formal opening of five national laboratories and research institutions under the auspices of the Council of Scientific and Industrial Research. The latest one to be inaugurated this month is the Central Food Technological Research Institute which forms the sixth of the eleven national laboratories planned for India.

The problems which the Institute will be called upon to tackle are of a wide nature. It has directly or indirectly to accomplish one task with which practical scientists have for years grappled, largely in vain. It has firstly to devise the ways and methods of improved agricultural production by the employment of better seeds, better manures, etc. In this work the Institute will of course get the benefit of the researches done in various directions by the Departments of Agriculture in the different Provinces. Secondly, the Institute has to work out practical schemes for the preservation and storage of the food materials which are likely to deteriorate with time. Hygienic preservation, dehydration, storage and canning have proved successful in foreign lands where food is available now in sufficient quantity in various forms. In India too, where the trained men are now forthcoming in pretty big number and the scope of research work is expanding, this is also within the range of practical achievement.

The elimination of the harmful constituents of non-edible materials and their conversion into healthy and attractive food is also another factor that will enlarge the range of articles we can use as food. This may divert the demand for staple foods, as we now understand, to channels of supplementary foods and effect a welcome change in the food habit which is essential to meet the present acute food shortage.

There is also an unlimited scope for scientific technological work on the maintenance of nutritional standards by the use of staple subsidiary foods containing proteins, manufacture of concentrated foods and vitamins, evolution of better strains of plant seeds, fortification of foods, etc.

We hope that the work done in the Institute will bear fruit in terms of human values and in the increase of suitable food for the public.

CURRENT TOPICS

SYNTHETIC PETROL

How far the deficiency of petrol in the country, can be met by the manufacture of synthetic petrol from raw materials available in India was considered by the Council of Scientific and Industrial Research. The importance of sufficiency of petrol supply is specially to be recognised in view of its use for national defence and transport. During the last war it was apprehended that the German resources of petrol would be soon exhausted but German scientists came to the help of their Government. They completed processes of manufacturing petrol from coal and thus maintained the supply of petrol till it was no more needed on account of the termination of the war. The deficiency of of petrol resources in India can in like manner be made up by production of synthetic petrol. In India the manufacture of power alcohol from molasses has long been under investigation and progress on this subject has been made in some provinces, but the researches have not yet come upon commercial processes. It is therefore gratifying to learn that the Planning Commission should give immediate consideration to the report of the Committee set up by the Council for considering the possibilities of manufacturing synthetic petrol in India and give the project the highest priority in national planning. The Council his appointed a Committee consisting of Mr. J. R. D. Tata, Mr. G. D. Birla, Seth Kasturibhai Lalbhai, Lala Shri Ram, Dr. S. S. Bhatnagar, Dr. J. C. Ghosh and Dr. D. N. Wadia. This Committee has also been asked to make a comparative examination of the synthetic oil project with a proposal to import crude oil and refining it in India and submit their final report before the end of the year.

Manufacture of synthetic petrol from coal will in our opinion involve a series of researches which will take time for their completion. But the urgency of the matter is so great that it will be risky for India to wait so long. In the meantime refining of imported crude oil to get petrol should be started on a pretty big scale. This industry may be diverted to other channels when manufacture of synthetic petrol becomes a reality.

ROAD RESEARCH INSTITUTE

The length of roads of all kinds in India is about 3.5 lakh miles and is quite inadequate for the growing trade of the country. Many areas of agricultural production are not still served by any railway line and it is sheer impossibility to pool in the produce of such localities for meeting the food and industrial requirements of the country. Want of riverways or partial chocking of the existing rivers which in seasons other than the rainy one get dry render the opening of a net-work of roads for easy communication and vehicular transport extremely essential. A Central Road Research Institute is going to be established for the purpose. The foundation stone of the Institute has been laid in Delhi. The role of the Institute will be to make researches in the making and maintenance of roads. The materials for surfacing roads and the methods of soiling, binding, rolling and carpeting to effectively bear the weight and speed of fast-moving road traffic are among the major problems of road construction and maintenance. The Institute will undertake investigations on the properties of materials of construction, their testing, and standardisation, characteristics of roads under different traffic condi-

[illegible] Now that the public have come to demand a [illegible] higher standard of road maintenance, India can no more delay an organised scientific approach to road construction and maintenance.

6-YEAR PLAN FOR DEVELOPMENT

The Commonwealth Finance Ministers will shortly meet in London to consider and prepare an over-all report on behalf of the under-developed South and South East Asian countries for their economic development. It is reported that India has prepared a six-year development plan for submission before the meeting. According to the plan it is estimated that while India's schemes involve an expenditure of about Rs. 1840 crores, its own resources available for investment in development projects in the next six years will amount to Rs. 1030 crores. Thereafter India will require about Rs. 800 crores by way of external aid spread over a period of six years, if the plans are to be carried through. According to the plan a sum of nearly Rs. 480 crores is to be spent on the railways and about Rs. 400 crores on major irrigation and multi-purpose projects of the Central and State Governments. Besides another sum of Rs. 180 crores will be spent on Government and other industrial measures and a sum of Rs. 200 crores on social welfare schemes like public health, education and housing, while rehabilitation gets about Rs. 75 crores.

ELECTRIFICATION OF MICA AREAS

The distribution of the electricity at Jhumri-Tilaya in Hazaribagh, the nerve centre of world's best mica—just in the middle of the over 200 miles long Ranchi Patna Road—is one effective beginning towards utilising electric energy in mica producing areas. The [illegible] supply is being made available from [illegible] transmission lines of the Damodar Valley Corporation running between Tilaya and Jhumri-Tilaya. The present supply of energy would be utilise for construction of Power House of the Damodar Valley Corporation of Tilaya. Bihar Government are tapping this distri buting sub-station and would extend supply to Kodarma and to mica mines a Domchanch and neighbouring areas. Extension of supply to Hazaribagh would be taken directly from Tilaya Dam and completed by the Bihar State Government shortly. It is expected tha D.V.C.S. programme for production o electric power at Tilaya to the exten of 2,500 K.V. would be completed b another two years' time. There is possi bility of almost immediate distribution o electricity at Giridih, another importar mica and coal centre. Madhupur, Deo ghar and Jasidih would also receive suppl after some time. It is thought that ex tension of 3 K. V. line to Gaya whe linked with future 132 K.V. grid line t Moghalsarai would be of advantage, a large scale development of load was cer tain to take place in and around Gaya. may be stated that already transmissio lines of longer distance than 50 miles a operated by Electricity Department o Bihar Government.

STORAGE BATTERIES

It is reported by the Commerci Secretary, Embassy of India, Tehera Iran, that as only a small area of Iran served by the railway, road transport essential to the economic life of th country, which is maintained by a lar number of motor vehicles. Consequentl there is always a demand for stora batteries in that country. As Iran has factory at present for the manufacture storage batteries it is entirely depende

of imports, India stands a fair chance of finding a market there, provided her supplies are of a standard quality and prices competitive. The value of imports of storage batteries in Iran during the three years ending 1948-49 amounted to 6.0 million, 6.5 million and 13.3 million Rials.

It should be remembered that Iran is not dependent on or in any way bound to the sterling area countries for her requirements, and obtains her supplies from any country which offers her goods of a satisfactory quality at a competitive price. No pains should, therefore, be spared by the Indian manufacturers to ensure that their products are capable of facing up to the competition that they are bound to meet.

Firms or individuals interested in contacting importers in Iran should address the Director General of Commercial Intelligence and Statistics, 1, Council House Street, Calcutta, furnishing him with their bank and other references.

THE SAGO INDUSTRY

The claim of the Sago Industry to protection or assistance was referred to the Tariff Board for investigation and report in May 1949. The Board has submitted its report. The scope of the enquiry includes only Tapioca Globules, popularly known as "Sabudana" or "Java Arsi".

The Board's recommendations are as follows:—A protective duty of 35 per cent ad valorem on the basis of the current tariff value of Rs. 30 per cwt. should be imposed on the imports of Sago globules and tapioca pearls from the British Colonies and the duty should remain in force up to 31st December, 1952. In order to restore the existing margin of preference in favour of British Colonies, the Standard rate of duty should be fix at 47 per cent ad valorem. If and w the tariff value is altered during the pe of protection, the protective duties sho be so adjusted as to ensure to the indu the same quantum of protection recommended above.

So long as import restrictions conti to be maintained for balance of payme considerations, imports of sago globu and tapioca pearls should be carefully gulated with due regard to the dome production of these articles and the pr pects of its further expansion.

If and when the production of tapi globules is stepped up appreciably a there is a substantial decrease in the c of production, necessary facilities sho be granted to the industry for export the surplus left over after meeting fu the domestic demand.

The Governments of Madras and United States of Travancore and Coc should take concerted steps to incre the output of tapioca root in their resp tive States and maintain up-to-date cords relating to tapioca production their States. The industry should obt the services of a foreign expert or se its technicians abroad for further traini so that necessary improvement in quality of its product may be effected a the cost of production appreciably redu ed. The Sago manufacturers at Sal should institute a single buying agency a co-operative basis to purchase the ent quantity of tapioca roots required by industry and to distribute it among various units according to their producti capacity. The Salem Sago Manufactu ers' Association should take early steps collect and maintain, with regard to ea unit of the industry, up-to-date statist relating to its capacity, actual month

ed samples of the raw material and other cognate matters and submit to the Board on behalf of its members, every six months, progress reports giving detailed cost data and statistics of their production, sales, sticks, selling price of tapioca globules and such other information regarding the supply of raw materials and other factors as may have a bearing on the efficiency of this industry."

Government accept the first recommendation and other recommendations in principle and steps will be taken to give effect to them as far as possible. As the margin of preference guaranteed under the Indo-U.K. Agreement of 1939 is only 10 per cent ad valorem the standard rate of duty will be fixed at 45 per cent ad valorem instead of 47 per cent as recommended by the Board.

COAL SURVEY STATIONS

A national coal survey will be made under the direction of the National Fuel Research Institute. Six regional centres are proposed to be set up in different zones of the coal-production. Five stations are already in the course of erection at a cost of Rs. 9 lakhs in the following coal bearing areas: Raniganj Field, Jharia Field, Bokaro, Ramgarh, Karanpura Field, Eastern States Coal Fields and Assam. One more station will be established at Kamptee in Madhya Pradesh to serve Pench Valley, Wardha Valley and Singareni Coal Fields. A pilot plant for carrying on experiments at the National Fuel Research Institute on coal washing, low temperature carbonisation, etc. is also to be set up shortly.

INDIAN COTTAGE INDUSTRIES

In view of the popularity of the Indian cottage industry products abroad and particularly in the United States of America, the Government of India are believed to have under consideration a proposal to set up a Government sponsored and Government-participating commercial corporation for the export of such products. For the time being, it has been decided to establish immediately a provisional organization to look after the exports of cottage industry products and handicrafts to the United States. The Central Cottage Industries Emporium of the Industry and Supply Ministry has already hired a showcase on board the trans-Atlantic liner, "Queen Mary," at an annual cost of £3000. There are shop-windows also in New York and Ottawa. It is proposed to have stalls in the various trade fairs in Paris, Chicago and the British Industries Fair during the current year.

DRAFT STANDARD FOR CREOSOTE AND ANTHRACENE OIL

Railway sleepers and wooden poles for telegraph and telephone lines used in India naturally vary considerable both in quantity and cost. Proper preservation of these materials as well as other timbers in general use is thus an important matter of national economy. The Bitumens and Tar Products Sectional Committee of the Indian Standards Institution has, therefore, brought out a draft standard for creosote and anthracene oil for use as wood preservatives. Two types of creosote oil and one type of anthracene oil have been standarised in the draft standard. Requirements of these types for such characteristics as fluidity, specific gravity, moisture content, matter insoluble in benzene, etc., have been specified. Test methods for the determination of these characteristics are given in five appendices. Several figures have also been included in the

...view and comments from interests in ...dia and abroad.

... unemployment problem. In West Bengal arrangements have been made with about half a dozen official and non-official training centres to train up 2028 persons of whom 1200 will be adult civilians and the rest displaced persons. At present 967 and 338 persons of the two categories respectively are under training in these institutes. The training is imparted free and the trainees are provided with free accommodation. Each displaced person and fifty per cent of the adult civilians are given stipends of Rs. 25 each to meet expenses for messing and workshop costumes. Regional Director of Resettlement and Employment, Government of India, for West Bengal, is Chairman for selecting candidates.

TRAINING AS TECHNICIANS

The Industrial Training Institute on ...andi Ghosh Road, Tollygunge, forms part of the Government of India's scheme for technical and vocational training of adult civilians and displaced persons. At present 341 persons are being trained at the institute in different trades, namely, motor mechanism, carpentry, general mechanism, draughtsmanship, welding etc. The course is for two years. Under the scheme, Government of India contemplates to set up sixty such institutes all over India with the three-

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Plastic Moulding Powders & their Manufacture

AMONG the most flourishing industries of the present day plastics occupy the foremost place. Since their invention innumerable types of small and big industries have sprung up with great rapidity. The whole field of light articles are now being manufactured and fabricated with plastics; such as, Radio sets, telephone, electrical goods, trays, dishes, penholders, inkpots, cups, waterpots, teasets, soapcases, watch straps, ash trays, paper cutter, etc. In other words all cheap articles of everyday use are now being manufactured with plastic materials.

Although this industry is flourishing in this country from day to day, it is regrettable that the manufacture of these moulding powders is not undertaken yet and manufacturers of these goods have to depend on foreign countries for their supply. It is now high time for our chemists and industrialists to take up at least some of the easily convertable products from indigenous raw materials, which require less costly machineries and less technical skill.

In this article it is proposed to describe the manufacture of some of the important plastic moulding powders, which can be easily manufactured.

There are a number of commercial materials which are described as plastics. These are essentially based on synthetic organic chemicals which are not found in nature. The wide range of plastic materials makes the choice of a proper material difficult for a manufacturer of plastic articles not too well versed in the plastic field.

There are two main well-defined classes of plastic materials thermoplastic and thermosetting plastics. Thermosetting materials are those which under the application of heat and pressure polymerises into a hard infusible product which will not soften to any extent on reheating and cannot be remelted and remoulded. A thermoplastic material can be softened by heat and rehardened into solid state by cooling. The most obvious distinction between thermosetting and thermoplastic materials is that the latter may be remelted and remoulded by any number of times.

THERMOSETTING PLASTICS

Phenol-formaldehyde moulding composition;
Cast Phenolic resins;
Soybean-phenolic moulding powder;
Urea Plastics;
Melamine-formaldehyde plastics;
Glyceryl phthalates; etc.

THERMOPLASTIC

Vinyl ester resins; Polystyrene; Polyvinyl chloride-acetate; Polyvinyl chlorides; Polyvinyl acetate; Polyvinyl acetals; Vinylidene chloride; Acrylic resins; Cumarone-inalene resin; etc.

CELLULOSE DERIVATIVES

Cellulose acetate plastics; Cellulose nitrate; Ethyl cellulose; Casein plastics; Zinc plastics; etc.

As the list of plastic materials is very elongated it is not possible here to deal with each and every material and their suitable applications. But with limited spaces at our disposal we shall try to describe as elaborately as possible some of the principal varieties of these moulding materials.

PHENOL-FORMALDEHYDE MOULDING POWDER

In preparing this resin, phenol and formadehyde are allowed to condense in a steam-jacketed chromium-lined or nickel

reaction kettle under non-refluxing conditions.

Either acid catalysts (usually sulphuric acid) or alkaline catalysts (usually ammonia or hexamethylenetetramine) may be used, but condensation will take place even in the absence of a catalyst. After the reaction has started the heat of the reaction becomes so great that cold water is substituted for the steam in the kettle jacket to control the reaction.

The molecular ratio of 1: 1, phenol to formaldehyde, is used to produce a thermosetting moulding compound. If a greater proportion of phenol is employed, a permanently soluble and fusible, though hard, resin may be obtained. This is suitable for use as varnishes and lacquers.

The formaldehyde employed in the reaction may be either the 37 per cent. aqueous solution known as formalin or dry form, paraformaldehyde.

When equal proportions of formaldehyde solution and phenol are used the mixture forms two layers after a few hours' heating. The lower layer consists of the syrupy condensation product and the upper layer one of water. The water may be removed by decantation and the lower layer heated (usually in vacuum) to eliminate as much of the remaining water as possible. The condensation syrup is then quickly poured into pans to cool to solid resin. Thorough elimination of the water results in the formation of a clear transparent product.

While the resin is still in the kettle, care should be taken to keep the walls and surface of the container free from a crust of hardened resin which will tend to insulate the rest of the contents, and may interfere with the handling of the liquid portion.

Tests to determine whether the reaction is complete consist in determining the viscosity of samples of the resin at frequent intervals. The hardened resin is tested for solubility and for polymerization time at various temperatures.

In the manufacture of moulding powders, the hardened resin is taken from the pans and broken up into large lumps and placed in a crusher, where the size of the pieces is reduced. These pieces are further ground in a high-speed hammer mill until they pass a 200-mesh screen. The powder is then blended with a small amount of lubricant (calcium stearate) in a ribbon blender and, if an acid catalyst is used, with a small percentage of hexamethylenetetramine to act as an activator. The soluble, fusible, hard resin in the cooling pans often is called the A-stage resin, and the final moulded and infusible product less frequently is called the C-stage resin.

To produce different grades of moulding powder, the basic powder is placed in a ribbon blender and mixed with plasticizers, additional lubricant, pigments, desired, and ... filler. Mineral fillers such as ... talc are also frequently used ... ed material may be moulded a... may be prepared in various size gra... tions or in pellet form. It may be p... between heated ... wood flour, mica, and ... plastic sheet which ... on a rack to a rigid sheet. This blend ... fed into a low-speed cutting machine ... cut to the desired granulation, or ... ed, and the oversize particles pass through the cutter again. A final blending is often made with other batches of the material or any other modifying substance.

A formula for a typical moulding compound:—

Phenol	12 parts.
Formaldehyde	27 "
Wood flour	52
Hexamethylenetetramine	3.7
Sulphuric acid	0.1

[illegible] 1.5 parts
Calcium stearate 0.7 ,,

Because of the natural tendency towards an amber colour in phenolics, they are seldom made in light colours. Dark red, brown, or a dark mottle most frequently used.

SOYBEAN-PHENOLIC MOULDING POWDER

No soybean protein plastic comparable to casein has been made commercially but a very good moulding powder can be produced of this for phonograph records and bottle caps.

Soybean-phenolic moulding powder is made up of about equal parts of phenolic resin, wood flour, and soybean meal from which the oil has been extracted with solvents. The soybean meal may be hardened with formaldehyde. This gives a mouldable plastic with a water absorption lower than that of casein but higher than that of straight phenolic material. These modified soybean plastics have nearly as great impact strength and flexural strength as the straight phenolic plastics and are more easily dyed light colours.

A typical formula is as follows:—

Formaldehyde	250	parts
Ammonia	26.3	,,
Phenol	250	,,
Alcohol	33	,,
Pigments	75	,,
Hexamethylenetetramine	26.3	,,
Soybean meal (oil extratcted)	330	,,
Wood flour	396.6	,,
Lime	26.3	,,
Water	12.4	,,
Stearic acid	4.1	,,
Zinc stearate	4.1	,,

The phenolic resin is first prepared by reacting the phenol and formaldehyde in a large stainless steel, steam-jacketed reaction kettle, usually in the presence of ammonia (catalyst). The other ingredients are added and the batch is then mixed first in a steam-jacketed mixing vessel, then in a banbury mixer until thoroughly homogeneous.

After this it is dried and ground in the manner already described, and screened. The moulding powder which emerges from the screening operation is finally blended with lubricants such as stearic acid, zinc stearate, or calcium stearate. Hexamethylenetetramine is usually added as an activator for the phenolic material.

UREA PLASTICS

Urea-formaldehyde resins are a type of transparent glass-like substance. They can be tinted in various colours and look better than bakelite articles. They are also thermosetting. When heated they first become thermoplastic and then set to an infusible mass. These resins are prepared either as aqueous dispersions, or as solutions in other media or as moulding powders. The latter is the most widely known form.

Urea resins have a number of excellent characteristics. They are resistant to oxidation, to oil, grease, weak alkalies, weak acids, alcohol, and other solvents. They are very hard, resist abrasion and scratching, and possess high tensile strength. The resin flows under heat and pressure and then sets, a process which can be brought about quite rapidly. The moulded products are inert, have no taste and smell, and are consequently popular for domestic uses.

The formation of urea resin takes place in two stages. First, a quantity of neutralised formalin, urea, and a small amount of ammonia are allowed to stand in the cold for about 2 hours to react, forming a transparent, liquid, A-stage resin which contains about 60 per cent condensation product. The character of the reaction product depends on whether

an acid, a neutral or an alkaline condensation medium is used. In the presence of ammonia or other alkaline condensing agents, mono and di-methylolurea, both crystalline compounds, are formed. A stainless-steel reaction kettle is used with chromium plating as alternative if the mixture contain thiourea. Theoretically, one molecular proportion of urea to two of formaldehyde should be used, but practically the formaldehyde ratio must be reduced to 1.5:1 to reduce the tendency to form gas bubbles during moulding.

The A-stage resin may be used for the impregnation of paper, fabrics, and cardboard, and may then be hardened by heat.

A preparation suitable for impregnating may be prepared from urea, formalin and 1.5 per cent phthalic anhydride, reflexing the mixture at 90°F and evaporating in vacuum until a syrup is formed.

Fabrics may also be impregnated with the A-stage resin and squeezed almost dry before being subjected to conditions which convert the resin to the C-stage, to produce modified, crease-resistant materials.

If it is desired to make plastic from the resin, dimethylolurea must be converted or made to form a gel. This is done with the elimination of water, and is characterised by a gradual change through a viscous liquid to a gel, as polymerization of the resin proceeds.

Gelatinization is spontaneous and is accelerated by heat and by the addition of 1 to 5 per cent of a neutral salt. Ammonium salts and acid salts may cause quick gelatinization. But it may be delayed by salts of the alkali metals with weak acids, such as sodium acetate.

In making moulding powder the A-resin is boiled to increase its viscosity and start the polymerization. The most suitable material, used in moulding powders, is produced by condensing one mole of monomethylolurea with one of di-methylolurea. This urea is sometimes u in moulding powders.

The viscous condensation liquor m be mixed with salts to prevent precipi tion before it is vacuum distilled to fo a partly polymerised thick syrup. Passa of a stream of dry air or inert gas throu the liquid during distillation helps remo volatile impurities. The syrup is th poured out and mixed with about one thi its weight of Alpha-cellulose filler in Werner mixer, and mixed at about 45°(The wet pulps so obtained is spread i trays to dry, at a temperature not abov 90°C. Drying is usually carried out i three stages. After thorough drying th material is ground to impalpable powde by means of a ball mill. Pigments, a smal amount of mould lubricant such as zin stearate, about 1 per cent of a solid aci substance as hardening catalyst, an various other modifying agents are adde during the milling operation.

Hexamethylenetetramine may be added to prevent loss of flow properties after storage; triphenyl phosphate may be added as a plasticizer, and sucrose may be added to prevent cracking during heat hardening.

After milling the powder is sifted through fine muslin and densified or put through a granulator to form granules of the desired size.

During the application of heat and pressure in moulding, the polymerization is completed. This resin is moulded at 285° to 315°F and pressures of 3000 lbs. per sq. inch. The rate of setting depends on the temperature applied, the form of the part, and the curing agents present. The finished part will not soften under heat and is insoluble.

A typical recipe for preparing 100 lbs. of moulding compound follows:—

[illegible]

[illegible]	[illegible]
[illegible]	48 ,,
Cellulose filler	40 ,,
Curing agent and lubricant and dye	4.8 lbs.

MELAMINE RESINS

These are a new class of thermosetting synthetic resins. They have a number of characteristics which assure them of a wide field of application.

A melamine resin may be prepared by adding 126 parts of melamine to 162 parts of formalin.

The starting point of these resins is the preparation of melamine, as this substance is not available in the market. On a small scale it may be prepared as follows:—

300 grams of dicyandiamide is placed in a 2 litre beaker. This is carefully heated on a hot plate. The mass begins to melt, and a vigorous reaction occurs. Copious fumes are given off which contain ammonia and sublimed melamine. The temperature may rise as high as 350°C before the reaction finishes. The contents of the beaker may be batched out and crystallised. In this way almost pure melamine is obtained.

Another method of preparing melamine is to heat dicyandiamide with concentrated ammonia for 3 hours at 120°C when a yield of about 35 per cent is obtained.

Now a melamine resin can be prepared by adding 126 parts melamine to 162 parts formalin which has been adjusted to a pH of 7.2 to 9.0 with the aid of a little caustic soda. The syrup then obtained, after heating in a reflux apparatus for 10 minutes, is sprayed at the rate of 10 pounds per minute into a hot-air drier kept under a two-inch vacuum, the white resin powder being continuously discharged at the same time.

[illegible] and modified [illegible] with drying oils to produce light-coloured coatings and baking finishes. They are somewhat similar to urea-formaldehyde resins and are thermosetting. So far, their chief commercial use has been as a binder, especially in insulating and in abrasive compositions.

Alkyd resins result from the condensation of polybasic acids with polyhydric alcohols. The polybasic acid most frequently used in the manufacture of alkyd resins is phthalic anhydride, and the most frequently used polyhydric alcohol is glycerin. The resin resulting from the condensation of these two compounds is also known as a glyptal. It has excellent electrical properties and is a good coating material, but is expensive.

In the preparation of alkyd resins, the polybasic acid and polyhydric alcohol in the proportion of 3:2 are cooked in a reaction kettle with various modifying agents. Other synthetic resins (melamine resine) may be added to improve certain properties; drying oils and natural resins or resin acids may be added for the production of coating materials; plasticizers and vegetable oils or fatty acids may be used to produce softer or more flexible products; solvents and diluents have various purposes in addition to that of forming a resin solution for casting cements or coatings; and water may be used in the production of water emulsions.

When the resin is obtained in the form of a water emulsion, it may be used, with the addition of pigments, as a water paint. The particles coalesce on drying to form a smooth waterproof coating.

The A-stage liquid resin, the resin solution, or the finely divided solid resin may be used to produce cements and coating materials.

The procedure for making the straight resin is extremely simple. It is only necessary to heat the materials, no other additions being essential. But occasionally other ingredients are incorporated as already mentioned to impart special properties to these resins. Two molecular proportions of glycerin and three molecular proportions of phthalic anhydride are cooked together for an hour, after which resinification begins, and a syrup is formed. With continued heating this becomes a gel. After several hours' heating a resin forms which hardens up and sets, becoming infusible and insoluble. The final setting action is rather slow even at quite high temperatures. Accelerating this has been a major problem with alloyed resins. In the intermediate stages they are thermoplastic.

The resin drawn off from the reaction kettle may be prepared for a moulding compound either by precipitation of the dissolved resin in a finely divided state or by grinding the solidified resin in a mill. To the resulting powder or granulation are added lubricants and any desired fillers or pigments. As the resin is thermosetting, compressio moulding is usually employed. The prepared moulding composition is worked by rubber compounding methods, then moulded in a press and placed in the curing oven.

CASEIN MOULDING POWDER

The transformation of casein grains into plastic moulding powder is done by mastication under the influence of heat and pressure in the presence of moisture with formaldehyde.

The mixing takes place in a dough mixer, and normally to 100 kilos of casein containing 10 per cent. moisture, are added 26 kilos of water. The water must be free from iron salts, and should either be freshly distilled or softened. For colouring purposes, where such is necessary and dyes are added [illegible] as fast to light as possible. The water is added to the mixer in the form of a spray, 15 minutes being occupied in the case of a charge of the size indicated, and the mixing continued thereafter for an hour.

The mixture of casein, water, etc. is now ready for extrusion, an operation performed in a horizontal screw extrusion press, consisting essentially of a 4-6 inches diameter revolving, screw fitted in jacketted boy with a feed hole at the back end, and a heated nozzle at the front. Over the feed hole is a hopper holding the moist casein, with a simple stirring and feed-regulating device. The body of the machine which surrounds the screw is fitted with two separate jackets provided with steam and cold water supplies. At the front of the screw a perforated steel grid is fitted behind a nozzle. which can be changed to give various sized rods, or fitted with a mandrel to produce tube.

For sheets two methods are used, the mixed coloured casein powder is spread in a suitably shaped mould and pressed, or the rods obtained by extrusion are cut into uniform lengths of suitable size; these are placed in moulds made of duralumin. The moulds are pressed in a multiple platen hydraulic press. The platens are heated to 180°—190°F and a pressure of about 600 lbs. per sq. in. applied for 3 minutes followed by application of full pressure up to 2 tons per sq. in. for a further 3 minutes. Cooling by water now follows, cold water being passed through the plants for another 6 minutes while the pressure is maintained. On removal from the press the sheets are soft, but quickly dry in the air and becomes hard.

TROUBLES AND PRECAUTIONS

It appears from the Report II. of International Labour Organisation, Geneva that there is considerable risks to health

[illegible] sions are taken. These risks, as eport says, come from phenolformal-lic resin which is produced by poly-ition of phenol and formaldehyde several processes, a ground or ised product is obtained which is worked on elsewhere. Phenol and ldehyde are both injurious to health. irritate the skin by direct contact in liquid or in gaseous form. In on, they induce over-sensitiveness in iuman organism. Very important the point of view of the genesis of disorders is the part played by he-hylenetetramine, which is used as a sing agent. The first symptom ob-l on the skin is that of superficial mations and, later, nodules and :s appear. Uncovered parts of the firstly the hands, forearms, face and ck, are affected. If the clothing be the poisonous element may even other parts of the body, in particu-irts exposed to irritation (such as guinal region).

le phenomena of sensitisation appear or less quickly. A fairly large por-f a working team becomes highly ve (according to Schwarz, as many per cent). From the clinical point w, these are cases of superficial ous inflammations similar to those d to above (sometimes even pim-or of the development of chronic 1. In one factory it was possible iblish the fact that as many as 30 nt. of the workers were affected by iseases.

le by side these skin diseases should ed cases of conjunctivities (in the / under consideration 40 per cent. workers were so affected) and irri-of the respiratory passages. In the [illegible] work done with mineral oils used [illegible] in manufacture, a specific oily acne may be observed.

The greatest occupational risk is to be found at the stage of manufacture at which formaldehyde vapours are created, in the refining of mineral oils (phenol), in work with rollers, during the loading of moulds and their pulverisation and during the work of pressing, that is to say in those particular forms of handling the material which give rise to the liberation of large quantities of dust. Similarly, the loading and pulverisation of wood meal, soaps, colours, etc., produce irritant dust in abundance.

As a preventive measure, it should first of all be laid down that, from the the technical point of view, manufacture should be carried on to the finish, that is to say, that an end should be put to poly-merisation. It is worked on unfinished plastic material which is above all the cause of numerous disorders. Further-more, manufacture should be, so far as possible, mechanised in order to prevent the hands of the workers from coming into contact with irritant substances. A local exhaust system for vapours and dust together with perfect general ventilation are fundamental conditions.

The protection of the body involves the use of working clothes, rubber gloves, artificial sleeves and aprons. Frequent washing of the hands being necessary, washrooms should be provided on the premises of the factory. During and after work the use of protective ointments is recommended. Time given to these pre-cautions should be paid for.

In conclusion, it is not out of place to mention that the manufacture of other moulding powders will be undertaken in a subsequent article.

—Bangle Industry at Ferozab

By Dr. R. M. Agarwal, M.A., Ph.D

THE history of bangle making at Ferozabad runs like a romance because wearing of glass bangles has always been regarded as a sign of 'Sohag' among the Indian women and is the most important ornament of the womanhood of India. This is also indicated in the following table showing the growth of factories over the fifties of the present century:—

Ytar	No. of Factories	Year	No. of Factories
1908	1	1929	20
1912	8	1931	22
1919	5	1932	34
1926	7	1941	45
1927	14	1945	70
1928	15	1947	72

Being born in the midst of antiquity and nurtured at the hands of the Indian Tariff Board, industry is yet an infant and runs only on a small scale. But this is more or less inevitable because being an art based on fire, it has got to be flexible enough to cope with changing patterns and designs. More so because bangle making was taken up by 'Shishgars' and 'Kacheras' (Muslim artisans who specialised in making bangles) as a part-time job, using their own land, labour, capital, organisation and enterprise.

RAW MATERIALS

The raw materials required for manufacturing glass bangles may broadly be grouped under:—

(a) Basic materials required for the production of bulk bangles: sands, soda ash and lime.

(b) Special materials for imparting particular characteristics: barium carbonate, felspar, magnesia, zinc oxide, lead oxide, borax, etc.

(c) Decolorizers, colouring and fini ing agents and opacifiers: s mium, manganese dioxide, ar nious oxide, cobalt oxide, ch mium oxide, nickel oxide, sulph etc.

(d) Oxidising and reducing age potassium nitrate, carbon, etc.

Silica is the most important r material used in the manufacture of gl and is obtained from sand, sandstone, a quartzite. But preference should be gi to sand. In order to produce glass of purest variety, the silica and iron conte of the sand should not exceed 90 per c and 0.05 per cent. respectively.

Sodium oxide is introduced in t forms, that is as soda ash and as s cake. The producers of bangles pre soda ash because it does not require high a temperature as salt cake and he economises fuel consumption. Moreo it does not make any severe attack u refractory materials in the furnace. S ash is generally used in pot furnaces a salt cake in tank furnaces. Another fo in which sodium oxide can be used is salt earth obtained from the Reh depo in U. P. This was used in the past o for manufacturing cheap and rou bangles but is used no more. The gr use of sodium oxide is to act as a flux a therefore glasses containing more than per cent. of sodium oxide become even slight exposure, dull and dirty in appe ance. But the factories at Ferozabad u as much as 30 per cent. which results heavy losses during rainy season beca the sudden rise and fall in temperatu and high level of humidity cause mu breakages.

[illegible] is generally obtained the form of limestone and is needed to ve resistance and stability to the glass. can be introduced in glass either as nestone or as quick lime. Bangle manufacturers at Ferozabad use only lime.

Other materials used are borax oxide reduce the co-efficient of expansion and crease the brightness in the glass, manganese oxide to cover the green tinge from m by superimposing a pink tinge from anganese, and zinc dust for the formation of selemium glass.

Besides the above raw materials, it is utmost importance to secure refractory aterials of suitable quality for upon them pends the life of the furnace, the life the pots, the quality of the glass, and e consumption of fuel.

FUEL

The various types of fuel required to oduce heat may be classified as solid, quid and gas. In solid form either wood coal may be used. The direct fixed rnaces at Ferozabad use bituminous al the reason being that the furnaces e inefficient and greater amount of temrature is needed to heat them. Among e liquid fuels most important is kerosene l and is required for joining the ends of ngles. None of the factories at Ferozad use gaseous fuel.

LABOUR

Unlike many other industries, the ngle industry at Ferozabad does not ffer from scarcity of skilled hands. his has also been the opinion of the dian Tariff Board which said, as far ck as 1930, that the factories which ey had seen they had formed the opion that the inferior quality of much of e glass-ware made was due not so much the lack of skill on the part of the anagement. The following is the estiate of the workers (men, women and children) employed in separate kinds of works at Ferozabad:—

1.	Employed in large scale works	3000
2.	Employed in state amber works	2500
3.	Employed in kora works	3000
4.	Employed in joining and levelling	4000
5.	Employed in coral pipe cutting	1500
6.	Employed in muffle furnaces	1000
7.	Employed in decorations	6000
8.	Employed in other capacities	5000
9.	Employed in bank ke aday	200
	Total	31200

PROCESSES

The operations necessary for the production of glass bangles may well be classified under:—

(a) Selection, preparation and mixing of raw materials
(b) Melting of the resulting 'Batch'
(c) Manipulation of the melted glass into bangles
(d) Annealing
(e) Finishing

The successful production of glass depends on a proper selection of raw materials and their chemical composition. At Ferozabad, the compositions that are used for producing the bulk glass for bangles have been evolved by methods of trial and error and hence kept a top secret.

There are two types of furnaces which are commonly used at Ferozabad for melting glass, namely the pot and the tank furnaces. Glass manufactured in a pot furnace is of better quality and tank furnaces are used for quantity products. Pot furnaces are very common at Ferozabad and are used for manufacturing fancy bangles. Tank furnaces are used only by factories manufacturing block glass for selling purposes. The usual capacity of pot furnaces is from six to twelve pots of 600 to 800 pounds each. The efficiency

[illegible] ompetitive world. But for the two wars nd the resultant stoppage of import f bangles, the industry at Ferozabad would have been nipped in the bud. In his connection the recent decision of the ndian Tariff Board to continue the exist- g revenue of 60 per cent ad valorem on nports of foreign made bangles would o a long way to help the further growth f this industry. The other recommenda- ons and suggestions which would help he industry in one way or the other re:—

RECOMMENDATIONS

(1) Technical assistance to the industry for further improvement in the efficiency of the skilled fabricators, to be achieved through organised research.

(2) Exports of glass bangles to other countries.

(3) Concessional duties on the export of glass bangles to Pakistan.

(4) Sufficient supplies of raw materials and consumable stores to the glass bangle factories, to be made available by the provincial Government.

(5) Organization of all bangle manufacturers of U.P. into one single association for the development of the bangle industry on healthy lines. The association is to [illegible]

SUGGESTIONS

(1) The provincial Govts. concerned should consider the possibility of how far and in what manner the bangle industry can be mechanised without putting to hardship.

(2) A central gas plant to be set up at Ferozabad at an early date for the economical utilisation of fuel and kerosene oil.

(3) The provincial Government should consider the question of opening a school at Ferozabad for specialised training in bangle manufacture.

DEMAND AND SUPPLY

No systematic figures for demand and supply of bangles are available. But the pre-war consumption amounted to 15,000 tons (valued at Rs. 109.3 lakhs) made up of 12,000 tons (Rs. 80 lakhs) from local production and 3,000 tons (Rs. 29.3 lakhs) from imports. Of the total imports, the percentage of countries value-wise was 39.1 for Czechoslovakia, 54.1 for Japan, 1.8 for Germany, 2.1 for British Empire and 3.8 for other countries. The figures of consumption have gone up considerably during the war and post-war years. Exports will also have to be increased. Hence it would not be too much to put it up at 20,000 tons.

The Indian Tariff Board, as far back as 1931-32, gave the following figures for daily production and its value:—

Manufacturing Works & its variety	Average No. of Factories	Fair working capacity	Average daily production and its value				
			Quantity in Mds.	Rate per Md.			Value in
		Mds.		Rs.	As.	P.	Rs.
Large Scale:							
*Block glass	4	120-150	500	4	8	0	2,250
Reshmi bangles	9	1500-2000	13500	0	5	0	4,500
Fancy bangles	6	1000-1500	6550	3	0	0	19,650
Small Scale:							
Rough bangles	70	200-250	14000	0	8	0	7,000

[illegible]

The present capacity, according to the Report of the Panel on Glass Industry, of the bangle industry is 18,000 tons per annum which according to the same Report, is sufficient enough to meet the total demand. Still they have fixed a target of 19,800 tons for the first five years which means an increase of 10 per cent. over the installed capacity. This will be utilised only in the manufacture of fancy bangles which were so far being imported from foreign countries.

LOCATION

The increased capacity may either be added to the existing works at Ferozabad or installed anew. The bangle industry at Ferozabad is already suffering from concentration. Save for labourers, who inherit this art from their ancestors, there is no advantage in having this industry at Ferozabad any further. All the raw materials (except Reh which is used no more) come from other parts of India which means heavy transportation charges both ways. Besides, bangles require delicate handling and careful packing before despatching which adds considerably to the prices that the consumers have finally to pay. This is also indicated in the following table showing the rates for Allahabad:—

	per tora		
	Rs.	As.	P.
Producers' selling price	3	8	0
Customs and Cartage	0	8	0
Transport Charges	0	4	0
Depreciation & breakage	0	12	0
	5	0	0

Hence the increased production should be started afresh. For this, Naini would serve as [illegible] sources of sand and other raw materi[als] are found in the near vicinity. Besid[es] the river Ganga and Jamuna can be util[ised] for transporting cheaply and quickly [the] finished products both up and down t[he] country. Water transport far apa[rt] Naini occupies a more central position [as] regards railways than Ferozabad. Lastl[y] the large numbers of refugees and di[s]placed persons inhabiting this area [at] the present can very easily be trained [in] this line of production. Such a pla[nt] would require capital investment of abo[ut] Rs. 97,500/- distributed on the various [units of] the industry as follows:—

		Rs.
1.	(a) Block Glass Factory	30,000
	(b) Bangle Manufacturing Factory	40,000
	(c) Weldless & Twisted Bangles	1,300
2.	Cutting Factory	25,000
3.	Firing Factory	1,200
		97,500

Recently, bangles of plastics a[nd] aluminium have come into active compe[ti]tion with bangles made of glass a[nd] unless and until our producers at Feroz[a]bad devote greater attention on quali[ty] they would have to face bad times ahea[d]. Besides, the acceptance by the Gover[n]ment of India of the Havana Charter a[nd] a ratification of the *Gatt* would me[an] further blows to our indigenous produc[ers] because under the above agreement [we] have got to import a certain amount [of] goods which we really do not requi[re]. Bangle from Czechoslovakia is one [of] them.

—GRANULAR EFFERVESCENT SALTS

GRANULAR effervescent salts are one of the few compounds much liked by rsons suffering from indigestion, acidity, d other bowel complaints. These granu- consist of an effervescing basis of citric d tartaric acids and sodium bicarbonate, th or without sugar and other ingredi- :s, which, when added to water, effer- sces owing to the evolution of carbon oxide. Sodium bicarbonate is universal- employed as the alkali because it is eap, easily obtainable, of a high degree purity, and when mixed with tartaric d. in excess or not, it forms a clear ution. Potassium bicarbonate is not ly dearer, but more of it is required to utralise the same weight of acid, and if taric acid is used in excess a precipitate cream of tartar is formed. Sodium carbonate effervesces in presence of an d and water because it is essentially dium carbonate and carbon dioxide. If y medicated preparation contains a tassium salt, tartaric acid must not be ed in excess, because in that case artrate of potassium would precipi- e, and would render to draught sightly.

It is well to understand at the outset w granulation takes place. If one were heat, say lemon kali (mixture of tar- ic sodibicarb) it would not become sty, for there is no citric acid in it, and is the citric acid in the granular prepa- tions which is the chief cause of granu- lon, assisted to a small extent by the isture of the sugar. The object to be ught is to apply enough heat to cause e whole to adhere, and to lose as little rbonic acid as possible during the pro- ss. The same result is obtained by mping the sugar or the mixed powders fore heating, but the difficulty of uni- tmly [illegible] unequal granulation. The only effective substitute for citric acid is bisulphate of sodium, while the undried magnesium sul- phate in sufficient proportion gives mois- ture enough to granulate. The following are the modern methods of granulating effervescent salts:—

B. P. PROCESS

Mix the powders thoroughly; place the mixture in a dish or pan of suitable form, heated to between 90° and 105°C. When the mixture, by aid of careful ma- nipulation, has assumed a granular charac- ter, separate it into granules of uniform and convenient size by means of suitable sieves. Dry the granules at a temperature not exceeding 55°C and should be stored in well-closed containers.

LUNNAN'S METHOD

In this process mix the sodium bicar- bonate, the sugar and the medicament, when present, pass them through a No. 20 to No. 30 incorrodible sieve, subject the acids previously mixed to the same pro- cess, and thoroughly mix the two sifted powders. Place the mixed powders in layers on a suitable dish, pan or glass tray, heated to between 75° and 86°C, if required, but not to exceed the latter tem- perature. When the mass by means of proper manipulation, kneading and com- pression, has assumed a uniformly plastic condition, suitable for granulation, rub it through a No. 5 to No. 10 incorrodible sieve, according to the size of granule de- sired and most adopted to the special effervescent preparation. Dry the granu- les at a temperature not exceeding 50°C.

NATIONAL FORMULARY METHOD

In National Formulary two methods have been outlined, namely:—

2. Granulating on a water bath.

Before actual adopting any of these methods the citric acid should be in unefforesced crystals and be finely powdered just before using. All the other ingredients should be well dried at a temperature not exceeding 50°C until they cease to lose weight, and then powdered and passed through a No. 60 sieve.

GRANULATING IN AN OVEN

The powders prepared as above are intimately mixed, without trituration, adding the citric acid last, spread about 10 m.m. thick on a sheet of paper on a canvas tray, glass plate, or in a shallow porcelain or enamelled dish and placed in an oven heated to a temperature between 95°—105°C. Allow the powder to remain on the oven, without stirring, until it becomes moist and acquires a proper consistence, about that of dough, then force the mass immediately through a No. 6 tinned-iron sieve, and dry the product at a temperature not exceeding 50°C. When dry, again pass the granular powder through a No. 6 tinned-iron sieve and immediately transfer it to bottles or containers and hermetically seal them.

GRANULATING ON A WATER BATH

If a small quantity of the salt is to be prepared, the powders, mixed as directed above, may be transferred to a covered dish on a water bath or to a double boiler, heated by water actively boiling, the inner dish being in contact with the water, and the resulting pasty mass stirred until dry. The dry granules should be immediately passed through a No. 6 tinned-sieve and transferred to a dry container, which should then be tightly sealed.

TYPICAL RECIPES

The following are some of the important recipes:

EFFERVESCENT EPSOM SALTS (

I.

Exsiccated Magnesium Sulphate	385
Sodium bicarbonate	360
Tartaric acid	190
Citric acid	125
Sugar	105

Prepare as described under method.

Adult Dose: 1 to 3 drachms.

II.

Sodium bicarbonate	
Tartaric acid	2
Citric acid	
Magnesium sulphate (powdered)	
Icing sugar	

Prepare as directed under method.

Dose:—1 to 2 drachms.

EFFERVESCENT SODIUM CITI TARTRATE B. P.

Sodium bicarbonate	510
Tartaric acid	270
Citric acid	180
Sucrose	150

Prepare as directed under Method.

Dose:—1 to 2 drachms.

EFFERVESCENT FERRI ET AM CITRUS B. P.

Iron & Ammonium Citrate	50
Sodium bicarbonate	460
Tartaric acid	240
Citric acid	175
Sugar	175

Prepare as directed under Method.

EFFERVESCENT LITHIUM CI

Lithium citrate	50
Sodium bicarbonate dried and powdered	570

Tartaric acid [illegible] grams.
Citric Acid 195 ,,

Prepare as directed under N. F. method.

Average Dose—120 grams.

Effervescent Vichy Salt

Art. Vichy salt	250	grams.
Sodium bicarbonate	485.5	,,
Tartaric Acid	164.5	,,
Citric acid	250.0	,,

Prepare as directed under N. F. process.

Average Dose:—60 grams.

The artificial vichy salt as used above may be prepared as follows:—

Sodium bicarbonate dried	864	grams.
Potassium carbonate dried	38.5	,,
Magnesium sulphate	80	,,
Sodium chloride	77	,,

Dry the magnesium sulphate, cool, add the other ingredients, and mix thoroughly.

Headache Saline

Potassium bromide	8	oz.
Sodium bicarbonate	45	,,
Antipyrin	2	,,
Citric acid	25	,,
Tartaric acid	25	oz.

All should be taken in fine powder and well dried before mixing, then granulate by any of the above methods.

Effervescent Quinine Citrates.

Quinine citrate	20	grams.
Sodium bicarbonate	510	,,
Tartaric acid	270	,,
Citric acid	180	,,
Sugar	140	,,

Prepare by Lunnan's method.

Effervescent Calcii Glycerophosphate.

Calcium glycerophosphate	¼	oz.
Sodium bicarbonate	5¼	,,
Tartaric acid	3	,,
Citric acid	2¼	,,
Sugar	2	oz.

Prepare as directed under Lunnan's method.

Effervescent Potassium Citrate (B. P.)

Potassium citrate	160	grams.
Sodium bicarbonate	460	,,
Tartaric acid	240	,,
Citric acid	140	,,
Sugar	140	,,

Prepare as described under B. P. method.

Average Dose: 1 to 2 drachms.

Effervescent Tablets.

These tablets, employed as thirst-quenchers, are best made by compression, using such powders as sodibicarb, citric or tartaric acid, etc., which have not been dried before mixing, or if so they should be damped with 2 dr. of proof spirit to each pound of powder, then granulated by sifting and drying before compressing. A useful article, intended for putting into a tumblerful of water, is made by mixing 8 oz. of icing sugar with 1 oz. each of sodium bicarbonate and tartaric acid and 10 drops oil of lemon; make this powder into a paste with a required amount of rectified spirit, roll out the mass to the thickness of ¼ inch upon paraffin paper, divide into squares, and dry at a gentle heat.

—Vegetable Mucilages:

Their Use in Screen Printing.

AMONGST the thickenings which find extensive use in silk screen printing, gum tragacanth and locust bean find general application. Locust bean thickening is the product of the tree shrub *Ceretonia Silique* and is available in the form of bean flour. Tragacanth is the gum from the shrub Astralagus Verus, and is marketed in the form of flat leaf-shaped pieces. Generally, the lighter in colour the product is, the better in quality and vice versa. Both products are used as sizing and thickening agents by weavers and textile printers, the locust bean type finding extensive use as a sizing agent, either alone or mixed with sago flour, maize starch, etc.

The following extract from TEXTILE RECORDER Vol. LXVII. No. 806 will give a detailed information about the preparation of thickening and their application to the screen printing as well as hand block printing of textiles.

PREPARATION OF THICKENINGS

Locust bean flour swells very quickly in cold water and when boiled for a short time—15 to 20 minutes—forms a useful and very soluble thickening for textile printing. The method of mixing requires careful supervision in that the flour is sprinkled into the cold water while constantly stirring. A method whereby dry material and water are added together by means of a centrifugal mixer enables thickenings to be prepared rapidly without the formation of lumps. Thickenings of this type are prepared generally at a strength of 8 ozs. of dry material per gallon of water and are afterwards reduced with water to the consistency required in the particular instance. In general, print pastes containing 4 ozs. per gallon of dry material will give good results, while in some cases as little as 1 or 2 ozs. per gallon may be used where very thin print pastes are required, as, for example, in printing bold patterns on thick materials which require to be well saturated with the print paste.

Tragacanth is prepared by soaking the material at 8 ozs. per gallon in cold water for 24 hours to allow swelling, followed by boiling from 4 to 6 hours to complete the process of producing a homogeneous thickening.

SCREEN PRINTING

In the printing of fast colours by screen, three classes of dyestuff are commonly used, namely, vat dyes, stabilised azoic dyes and the leuco esters of vat dyestuffs. In the application of these classes of colours both the thickening agents mentioned are used.

In the application of the vat dyestuffs two methods are commonly used:—

(1). The potash or soda ash—Formosul method.

(2). The Colloresine method.

In the first of these the dyestuffs are printed with thickenings containing alkali and reducing agent plus a hygroscopic agent, such as urea or glycerine, the fixation of the colour taking place under the influence of steam in such arrangements as the rapid ager, star steamer, indanthrene steamer, etc. The thickening commonly used for these prints is a mixture of wheat starch, British gum tragacanth. In this particular instance locust bean thickening is not applied, due to the fact that

its [illegible] made of colours are kept for fairly long periods. It should be noted here that for screen printing the soda ash method gives better results, and in many cases water absorbing agents, such as urea, should be omitted from the print pastes, especially where good steaming conditions are available.

The value of gum tragacanth here lies in the production of prints which are more easily penetrated, give better levelling, are softer to handle in the dry state and are more easily washed off.

The use of locust bean thickeners for the application of vat dyestuffs lies in their value when used after the manner of the colloresine process. The principle of this method is that the thickening agent employed, either methyl-cellulose of locust bean thickening, is rendered insoluble under the influence of free alkali and hot water. This means that the dyestuffs in paste form can be thickened with a locust bean mucilage without the addition of either alkali or reducing agent, and printed in the ordinary way. Such prints, when dried, will keep indefinitely and their fixation postponed until such time as a quantity of prints has accumulated. Fixation of the dyestuff then takes place by passing the printed materials through a solution in a padding mangle containing the necessary reducing agent and alkali. For example, the solution may contain caustic soda and a reducing agent in the form of sodium hydro-sulphite or sodium sulphoxylate formaldehyde at a high temperature. By this means a very quick reduction of the dyestuff is brought about when the thickening is in the insoluble state, fixation being assisted by the passage of the goods, while still in the wet state immediately, after padding, through a small steam box, and developing being carried out through subsequent and rapid passage through oxidising agents such as bichromate or perborate solutions. Modifications of this method include padding of the goods in potash or soda ash formosul thickenings with intermediate drying and subsequent steaming in the ordinary way in a rapid ager or festoon steamer.

STABILISED AZOICS AND LEUCO ESTERS OF VAT DYES

As these groups of dyestuffs are generally applied together by the acid steaming technique the observations on the thickenings used will apply to both. Generally, thickenings with a starch basis are used along with gum tragacanth where additional penetration is required. Levelness in blotch printing may be assisted by the use of British gums along with the starch tragacanth mixtures.

Where the neutral chromate process of acid steaming is used some fixation of the starch and the tragacanth by the chrome radical in steaming may be expected, with consequent stiffening and hardening of the printed goods. A higher proportion of British gum thickening in such cases may produce the necessary improvement, while, if much difficulty is experienced, some of the newer cold swelling and hydrolysed starch products may be applied with considerable success. For the most part, however, thorough washing and soap boiling after development of the prints will produce the softness required, with the occasional use of de-sizing agents such as malt extract, in difficult cases. With the stabilised azoic dyestuffs it is always safer to use gum tragacanth rather than the locust bean type, due to the poor keeping qualities of the latter under the influence of free alkali. Here again, however, modifications in the print paste formula may allow substitution of locust bean [illegible]

For example, in the production of very light shades, and in a good many members of the series of stabilised azoics, even in the darker colours, the proportion of free alkali in the form of caustic soda may be very considerably reduced. Again, the use of solvents and developing agents like di-ethylene glycol and dimethyl-amino ethanol, which are used for the development of these dyestuffs in neutral steaming, introduces the possibility of the use of the cheaper locust bean instead of of the more expensive tragacanth.

CHROME MORDANT DYESTUFFS

Thickening here also consist largely of starchy bodies which may be mixed in various proportions with British gums and either tragacanth or locust bean thickener. One of the main difficulties is the hardening of the prints with the chrome mordant during the process of fixation. This has largely been overcome by the use of special mordants, such as chromium lactate, together with the addition of such solvents as urea. The effect here is to inhibit the formation of the chrome-starch complex during steaming and so produce a softer handle in the finished goods.

In this, as in all other classes of colouring matter for printing, the value of the starch basis lies in increased colour yield obtained. Where levelness is required a higher proportion of British gum is necessary. This, in turn, affects the colour yield adversely, mainly by the reducing action of the dextrine formed in the conversion of starches to gums. In all cases, however, where penetration is an important factor, the addition of either tragacanth or locust bean thickening will provide valuable assistance and will, in addition, enable colour yield to be maintained.

[illegible]

With this class of colouring [illegible] there are no involved chemical reactions such as the alkaline reducing action of the vat dyestuffs or the strong oxidising re-action in the case of leuco esters of vat dyes.

The print pastes are simply prepared by the addition of the dyestuff, already mixed to produce a variety of shades, to the prepared thickening which may take the form of a pure gum tragacanth or pure locust bean thickening. Other thickenings such as starches, gums, etc., may also be applied with equal facility in the actual printing operation. Where, however, applied with equal facility in the actual good penetration of the prints and ease in subsequent washing off are the prime essentials, vegetable mucilages take first place. In this particular type of printing the starches and gums which may or may not be mixed with a proportion of vegetable mucilage find application only where penetration is either not required or else is avoided for special reasons. For example, in the printing of some types of dress goods fabric by the "sticking down" method on screen-table tops, it is important to avoid excessive penetration, with consequent soiling of the table tops which, in turn, will require frequent washing. This is achieved by using thicker print pastes with a higher proportion of solids content in the form of British gum, etc., so that penetration is reduced to a minimum. It should be borne in mind here that good fixation in subsequent steaming is necessary when using this method of application, due to the fact that the large solid content of the thickener inhibits in some degree the penetration of the steam into the fibre and prevents to that extent the absorption of the dyestuff by the swollen fibres. Where poor fixation results in such cases, it is plain that trouble will be

[illegible] due to
he [illegible] off of [illegible]
yestuffs.

As may be gathered from the fore-
oing remarks, the use of the vegetable
ıucilages in such types of printing where
enetration is essential has many advan-
ıges and will result in better fixation of
ıe dyes in steaming, clearer and brighter
›lour effects, cleaner grounds in washing
ff, and a softer handle and finish.

ACID AND DIRECT DYESTUFFS BY THE UREA PROCESS

The remarks which have been made
lating to the cellulose acetate dyestuff
inting also apply very largely to the
ıove dyestuffs. These dyestuffs in most
ıses are easily soluble in hot water and
is solution is then added to the made
› thickening to form the print paste.
ue again to the absence of chemical re-
ıents of any kind the made up print
stes have good keeping qualities, espe-
ılly when small quantities of preserva-
es have been added in the case of the
ust bean type and very good results
ll, in all cases, be obtained with the use
either of the mucilages under discus-
n.

Where, however, mixtures of thicken-
's are used for any purposes it should
borne in mind that many of the acid
d direct dyes are easily susceptible to a
lucing action, especially under the in-
ence of steam for fixing the colours.
d for this reason large quantities of
tish gum thickeners should, if possible,
avoided. On the other hand where
h additions are found to be necessary,
mall amount of a mild oxidising agent
he form of one of the resist or reserve
s commonly used will prevent this re-
ing action and will prevent the colour
ıes of the dyestuff in printing.

It should be observed here that one of
outstanding points in the use of mu-
ges of these types is their great solu-
bility and easy removability. This is of
particular value in screen printing where
quantities of thickening agents are appli-
ed. For example, the general experience
is that somewhere about three times the
amount of thickening agent is applied by
screen as compared with roller printing
and the greater the solubility of the thick-
ening agent the more easily the prints
will be handled in wet processing.

HAND BLOCK PRINTING

Similar observations with reference to
the foregoing remarks on print pastes
and dyestuffs apply equally to hand block
printing.

Some detailed observations of the va-
rious applications of the vegetable muci-
lages, may however, be of interest. For
example, in the printing of nylon with
hand blocks on which the pattern is built
up with fine copper strips, the use of a
tragacanth thickening was found to give
good results. The main points here were
that very fine printed effects can be ob-
tained using a very thick solution of tra-
gacanth at 6 to 8 ozs. per gallon of a good
quality product. The low solid content of
the thickening enables good penetration
of the print to be obtained while the clari-
ty of the colours is, at the same time, pre
served and, due to the good fixation in
steaming, it is possible to process the goods
without washing. The dyestuffs used in
this particular instance were selected
members of the cellulose acetate range of
colours.

BLOTCH PRINTING

In the printing of all classes of dye-
stuffs by hand block in blotch patterns,
i. is often essential to obtain simultaneous
levelness and penetration of the print.
In many cases this can only be obtained
by the addition of gum tragacanth which,
in such circumstances, gives rather better
results than locust bean thickening. In

many cases, however, good coverage of the pattern and penetration cannot be obtained unless the face of the block is covered with a layer of cotton material in order to assist the furnishings of the face of the block. In some instances covering of the face of the block in this way is not feasible, due to the fact that fine white effects are carried through the blotch portion of the pattern and would easily fill up in printing if cotton coverings were applied. In such cases levelness will have to be obtained by the use of thickenings with a higher solid content, such as British gums etc., and penetration may have to be sacrificed to some extent, although, in many cases, it may be possible to compromise by adding a proportion of tragacanth to such thickening agents, together with other expedients such as the addition of wetting agents to the print paste and the preparation of the fabric prior to printing in solutions of wetting out agents.

Where wood surfaces only can be used some asistance may often be obtained by "facing" the block by rubbing it on an absolutely flat block of sandstone or on a flat surface with a sheet of glass paper. In broken up designs good penetration will readily be obtained by the addition of tragacanth, etc., either alone or with starches and gums. In such styles levelness is not a prime essential and may be sacrificed to some extent to penetration.

COLLOIDAL PROPERTIES OF VEGETABLE MUCILAGE

One of the virtues of this type of thickening lies in their powers of suspension of solid materials embodied in printing pastes. For example, white discharge printing pigments, such as titanium dioxide, are held in good suspension and may be safely used in screen printing without danger of filling in either the screen mesh or the ... of the ... block.

In block printing one other examp... may be given. Where faulty thickenin... have been used in the first instance as certain classes of British gum thickenin... where an insoluble residue is obtaine... this residue settles down on the face ... the printer's block and fills in the fine po... tions of the design. Where trouble ... this kind is encountered an addition ... tragacanth or locust bean thickening w... hold the soluble portion of the pattern ... suspension and will induce trouble-fr... prints.

SOFTNESS

The soft handle of prints from t... point of application to the finished artic... is one of the outstanding features in t... application of this type of thickening a... may be brought into play to considerab... advantage in the printing of large mass... of colours on such materials as furnis... ings cretonnes with the fast type ... chrome mordant dyestuffs. Liner... especially, with large masses of pri... paste applied, are liable to crack wh... handled in the dry state prior to wet pr... cessing and an addition of one of the... thickenings will often introduce the pliab... lity and softness necessary to avoid th... cracking effect and subsequent possib... serious damage to the goods involved.

Vegetable mucilages, generally, a... useful as thickening agents in textile prin... ing because of their low solid conte... good solubility and good thickening pow... ers. They may be applied with mo... types of dyestuffs if careful considerati... is given to the circumstances involve... They induce good penetration of t... print paste, good fixation of the dyest... in steaming and ease the problems ... washing off and finishing.

[illegible] with gum acacia or gum Senegal or too much British gum. As an addition to other thickenings mixing should be done by adding to the vegetable mucilages whilst stirring rather than vice versa.

[illegible] should, generally, be avoid-ed except in the special circumstances outlined. The keeping qualities of the thickenings are increased by the addition of preservatives such as phenol and formaldehyde.

—PRESERVATION OF INKS

IN former days the liability of every ink to mould was accepted with resignation as an unavoidable evil. The visible moulding of an ink is however, only a symptom, and is attended by many undesirable changes. For example, an ink to which cane sugar has been mixed in place of gum arabic to produce gloss often becomes so tough that long threads spin from the nib, and it cannot be written with. This results from the fermentation of the sucrose, and can usually be cured by shaking the ink with a freshly prepared gall decoction, and then keeping it aside. In a short time a tough black precipitate forms, and if the supernatant liquor is decanted it will be a useful black ink.

The fermentation processes which result in the formation of lactic acid have a much more serious effect upon ink, as they gradually destroy the colouring matter. If we find that the ink becomes pale and acquires a strongly acid taste, we may be sure that it will soon be useless. If the process is carried out in time, the ink can be saved by boiling it with some clean iron nails. The ferment is thus killed, and the lactic acid is brought into combination.

When the ink becomes mouldy it gradually gets covered with a green, felty layer of grayish-green fibres, which grow again as fast as they are removed and with such speed that the whole surface will be recovered in a single night. Even if we throw away the ink and kill the germs adhering to the vessel by boiling it in water, the remedy is only temporary. When the vessel is refilled with fresh ink, it will soon get more germs from the air, and the growth will get as thick as ever, and for a long time no means of combating the evil as thick was known. It was [illegible] found that an excess of ferrous sulphate has a preservative action, but with the result of increasing the cost of manufacture, and causing the ink gradually to deposit a sediment and to produce characters which quickly turned brown. Additions of alum, too, were found very effective in preventing mouldiness, but cause the ink to corrode steel nibs, and in the absence of considerable amounts of acid precipitate the colouring matter in the form of an alumina-lake. This not only makes the ink pale, but makes it flow less freely, as may often be noticed in logwood inks containing alum.

It was long since noted that alizarine inks made with ordinary vinegar were very apt to mould, while those made with pyroligneous acid rarely or never went mouldy. The reason of this certainly rather striking fact is that the pyroligneous acid contains a certain amount of carbolic acid, which is an extremely powerful disinfectant and hence an efficient preventive of mould. It is better to preserve the ink by adding carbolic acid to it than by using pyroligneous acid in its manufacture. Carbolic acid is very cheap, and the ink is perfectly preserved by one-thousandth of it own volume, or even less. The acid possesses, however, a very penetrating odour, which is plainly perceptible even when the acid is highly diluted, and which, as we have reason to know, has brought even very excellent inks for disfavour. We possess at the present time, another splendid antiseptic which is perfectly odourless in the shape of salicylic acid. It has no bad effect on human beings. According to our results it will completely preserve from 5,000 to 10,000 times its weight of ink. A little of it put into the ink-vat will prevent moulding for good and all. The

salicylic acid can be added solid or dissolved in a little spirit.

Boric acid is another preservative not less to be recommended. It occurs in the form of mother-of-pearl-like shining crystals, soluble in cold water with some difficulty, but easily in hot. This body too, will preserve 1000 times its weight of ink and upwards from mould. The best plan of using it is to hang it in a bag in the ink, so that it will gradually dissolve.

Many anteseptics, the often recommended corrosion sublimate for example, seem to us very ill-suited for ink preservation. Corrosive sublimate, in particular, is very poisonous as well as expensive, and we have in salicylic acid a completely innocuous and in every way suitable substance which is as powerful antiseptic as the mercury compound.

Ethereal oils in general, and above oil in particular, also possess antiseptic properties, and we therefore find that the addition of a few cloves or a few drops of the oil to an ink is quite good. But an ink to which oil of cloves has been added necessarily acquires its smell, which is a disagreeable one to many persons. Besides the preservation by clove oil is only evanescent. In time exposure of the ink to the air resinifies the oil, and it loses its antiseptic power completely.

We thus conclude from a general survey that salicylic and boric acids are the antiseptics which offer the greatest advantages to the ink maker, and which should therefore be universally used.

METHODS OF PRUNING OF TREES

IT is a known fact that a healthy tree possesses a rooting capacity almost equal to the vigour of its branches. If, therefore, we severely prune the branches, and do not at the same time restrict the growth and number of the roots, a reciprocity, or perfect balance, between branch and root is wanting, and we find the latter is capable of transmitting more food to the former than its limited number of shoots and buds can utilise. The superabundant sap must find an outlet resulting in the growth of coarse shoots full of watery saps. These shoots continue to grow and in their turn form fat wood buds all along their length. Few of them mature properly, and fruit buds have, in consequence, little chance of developing.

In order to maintain the growth of the plant well balance between its roots and branches, a number of ways of pruning are undertaken by the grower whereby the fruit or flower yielding capacity of the tree is increased.

In this article it is proposed to discuss the various methods of pruning to maintain the vigour of the plants.

GENERAL PRINCIPLES OF PRUNING

The following principles are of general application, whether for large or small trees.

1. For fruit bearing trees, thin out branches so as to allow free access of light and air, remove all dead wood, snags, superfluous suckers and shoots.

2. Always use a sharp knife or saw, and cut in a slanting or upright direction, so as to throw off the rain; have a smooth surface.

3. When cutting back lateral branches, always cut a fork.

4. In removing a large branch, saw it off roughly (cutting the underside first, and then the upper a few inches further from the stem than the first cut) a foot from the trunk, and finally saw off the stump left and plane the surface.

5. Smear coaltar over large cuts; otherwise the action of sun-heat may crack the wound, thereby allowing moisture to enter and enabling parasitic fungi to obtain a footing.

6. When cutting branches, especially large ones, avoid leaving stumps several inches long; always cut a branch in a line and flush with the outside of the stem or branch from which the portion reomved issues.

7. In general, pruning should not be performed during severe drought, nor when crops are in active flush.

PRUNING OF SHADE OR FLOWERING TREES

The object in regard to the pruning of these should be to obtain a form which, while developing the natural beauty of the tree, will tend to prolong its life and usefulness. The longest-bird trees are those with a straight, erect, and undivided main central axis or trunk. An upright, evenly radiating system of branching, commencing from a height of about 6 feet from the ground, is generally desired, and this may be induced by careful attention to the tree when young.

COLLAR PRUNING

Collar pruning, i.e., sowing of the main stem or stems at, or a little below, the surface of the ground, is occasionally resorted to when tea bushes become old and unproductive or to eradicate a formidable pest. It differs from cutting down, which is more common, the bust in the latter case being cut at a height of 6 to 10 inches. In both cases the operation should be carried out in the rainy season

THUMB-NAIL PRUNING

A term applied to the nipping off of the terminal young bud, as done by the thumb-nail and fore-finger, being a form of pruning conveniently applied to tender plants. At one time it was recommended for young Hevea rubber trees, being adopted when the trees were about 6 to 8 feet high, the object being to induce a more rapid increase in girth of stem and a branching top.

ROOT PRUNING

Root pruning is sometimes employed in the cultivation of fruit trees with the object of counteracting a too luxuriant woody growth, which results in paucity of fruit. A trench is cut round the tree at a suitable distance from the stem, and three or four feet deep. All the roots as they are found are cleanly cut, and if a long tap-root is suspected to entering the sub soil it should be searched for by careful undermining, and severed.

CAVITIES IN TREE-TRUNKS

Very often when a tree has been long neglected, the trunk is seriously injured by cavities caused by the decay of dead or broken branches. With skilful pruning the progress of this evil can be arrested. The edge of the cavity should be cut smooth and even and all decomposed matter in the interior carefully removed. A coating of tar should then be applied to the surface of the cavity, and the mouth plugged with a piece of well-seasoned hard wood, securely driven into place, the end of the plug being then carefully pared smooth and tarred or the cavity may be carefully filled with a mixture of cement and tar.

It is found that in some cortical or bark pressure becomes so great as to retard the growth of trees, preventing the formation of the normal amount of new wood. In temperate climate this unhealthy condition is considered to be indicated by the natural shedding of the leaves being impeded. Longitudinal incisions made in the bark, without removing any tissues are supposed to relieve the bark pressure, being followed by a natural increase in thickness of the affected stem.

RING-BARKING OR RINGING

These are terms applied to the removal of a strip of bark, varying in breadth from a few inches to as much as two feet, according to the size of the tree, from near the base of trees. To be successful it must be performed during the period of greatest cambial activity. The direct effect of this is to cut off the downward flow of sap and food material between the leaves and the roots. Where trees are required for timber, the process of killing by ring-barking is considered to improve the quality of the latter. A form of ringing is sometimes adopted to hasten the ripening of fruits, or to render unfruitful trees productive.

POLLARDING OR COPPICING

This is commonly applied to trees which have become too large or ungainly or for the purpose of retaining trees within certain desired limits of growth. It is also commonly practised with shade or green-manure tree among plantation crops, the loppings being employed for mulching or green-manuring. Briefly, the operation consists of cutting back the main stem at a convenient height also the branches periodically. In effect, it is applied to certain cultivated crops, e.g. tea, camphor, coffee, etc., in the routine of harvesting and cultivation.

PHARMACEUTICAL RECIPES

ASTHMA HERBAL DROPS

Ingredient	Qty	Unit
Tinct. of stramonium	1	part.
Laudanum	1	„
Anise-ammonia	1	„

Mix.

Dose 10 to 15 drops in hot sugar water, thrice daily.

LOTION FOR USE AFTER DEPILATORY APPLICATION

Ingredient	Qty	Unit
Acetic acid	2	oz.
Zinc acetate	16	„
Lavender Oil	2	„
Distilled water	100	„

Mix until dissolved; filter through magnesium carbonate or talc to clarify.

EXTRACTION OF SANTONINE

Take of wormseed, 4 parts; hydrate of lime 1½ parts; mix and exhaust them with alcohol of 90%; distil off ¾ lbs. of the spirit and evaporate the remainder to one half, which, at the boiling temperature, is to be mixed with acetic acid in excess, and afterwards with water; on repose, impure santonine subsides; wash this with a little weak spirit then dissolve it in rectified spirit 10 parts, decolour by ebullitions for a few minutes with animal charcoal, and filter; the filtrate deposits colourless crystals of santonine as it cools; these are to be dried, and kept in opaque bottles.

ULCER OINTMENT

Ingredient	Qty	Unit
Zinc oxide	175	gr.
Boric acid, finely sifted	175	„
White soft paraffin	3½	oz.
Hard Paraffin	2	„

Melt the hard paraffin and mix the soft paraffin. Then remove from the source of heat. Triturate the boric acid and zinc oxide until smooth and put in pots.

ANTI-RHEUMATIC LINIMENT

Ingredient	Qty	Unit
Capsicum	1	oz.
Oil of turpentine	1	pint.
Menthol	1	oz.
Oil of origanum	3	dr.
Oil of gultheria	1	oz.
Oil of camphor essence	1	pint.

Macerate the capsicum with the turpentine oil and then add the other ingredients one by one.

MOUTH WASH POWDER

Ingredient	Qty	Unit
Borax	1	oz.
Thymol	1	grain.
Menthol	1	„
Methyl salicylate	5	mins.
Eucalyptol	5	grains.
Oil of clove	2	mins.

Mix the flavours with a little alcohol and spray in the borax powder. Allow the alcohol to evaporate and pack the powder at once in glass bottles.

HAIR TONIC

Ingredient	Qty	Unit
Tincture of cantharidin	6	oz.
Quinine hydrochloric	1	„
Tincture of capsicum	2	„
Glycerin	8	„
Bay rum	6	gal.

Tincture of cudbear sufficient to colour.

TOOTHACHE ESSENCE

Ingredient	Qty	Unit
Menthol	2	drams.
Camphor	2	oz.
Chloral hydrate	3	„

Mix.

ANTIPHLOGESTIC PASTE

Ingredient	Qty	Unit
Kaolin	505.0	grms.
Boric acid	45.0	„
Thymol	0.5	„
Methyl salicylate	2.0	„
Oil of peppermint	0.5	„
Glycerine	387	„

Take kaolin and heat it to 110°C to drive off all traces of moisture and then allow it to cool and reduce to fine powder. Now mix the kaolin with the boric acid, and then thoroughly incorporate the warm glycerine, which has in the meantime, been rendered anhydrous by heating it for a short time to 100°C. Finally add the thymol, dissolved in the methyl salicylate and oil of peppermint, and make into a homogeneous mass. Preserve it in air-tight containers.

This mixture possesses emollient and antiphlogestic properties and is therefore largely used to allay inflammation in the treatment of pneumonia, boils, carbuncles, etc., and in dermatological practice.

MARCUSSEN'S OINTMENT

Ingredient	Qty	Unit
Potassium Hydroxide	22.5	grams.
Sublimed sulphur	12.5	„
Yellow soft paraffin	22.5	„
Wool fat	22.5	„
Zinc sulphate	2.0	„
Sodium hydroxide	0.8	„
Distilled water	51.7	c.c.
Benzaldehyde	0.5	„
Liquid paraffin to make	100	grams.

Dissolve the potassium hydroxide in an equal weight of water, and the sulphur, boil gently until dissolved, and mix the solution with the yellow soft paraffin and wool fat. Dissolve the sodium hydroxide in the remainder of the distilled water, and the zinc sulphate, shake well, and incorporate the mixture with the ointment then add the benzaldehyde and sufficient liquid paraffin to produce the required weight.

It is detergent and stimulant, and is used in ringworm, itch, psoriasis and some chronic skin diseases.

Recipes for Small Manufacturers

BLACK FLEXIBLE LEATHER VARNISH

A good varnish may be prepared as follows:—

Shellac	100	parts.
Gum sandarac	25	"
Venice turpentine	25	"
Pale rosin	25	"
Castor oil	20	"
Nigrosin (spirit soluble)	15	"
Methylated spirit	790	"

Place the ingredients in the methylated spirit and shake at intervals until dissolved. Finally strain through linen and bottle for use.

DOG SOAP

Linseed oil	18	parts.
Caustic potash	4	"
Water	6½	"
Cresol	1	"
Rectified spirit		q.s.

Dissolve the caustic potash in water. Next warm the linseed oil on a water bath and slowly stir in the caustic potash solution. When the saponification is complete, add water if required. Then add a small quantity of spirit and cover the mass with a cup. Continue heating until the soap becomes transparent. Finally mix the cresol and set aside to cool.

LAUNDRY BLUE TABLETS

Ultramarine	6	oz.
Sodium carbonate	4	"
Glucose	1	"

Water a sufficient quantity.

Make a thick paste, roll into sheets and into tablets.

ARTIFICIAL LEMON SQUASH

Sugar	2	lbs.
Citric acid	1	oz.
Distilled Water	28	oz.

Dissolve and add the following, previously prepared:

Oil of lemon	½	dr.
Tinc. of lemon peel	1	oz.
Tinct. turmeric	½	dr.
Caramel	20	mins.

Shake up the tincture of lemon peel with oil of lemon occasionally during 4 hours; allow the oil to separate, decant the tincture and mix the latter with the other ingredients and filter.

VALVE GRINDING PASTE

Ammonium linoleate	10	parts.
Oleic acid	1	part.
Water	20	parts.
Green Silicon carbide	50	"
Powdered quartz	15	"

Mix. Keep ... while applying.

... XLI. ...

TABLE VINEGAR

Ginger	1	oz.
Pimento	1	"
Long pepper	2	"
Black pepper	2	"
Mustard	2	"
Vinegar	2	pints.

Bruise the spices and simmer gently in the vinegar for 10 minutes, cool and strain. The vinegar prepared in this way is used with any vegetable.

ADHESIVE POWDER FOR DRIVING BELTS

An adhesive powder for driving belts may be prepared from 1000 parts of powder soda ash, 375 parts of carbonate of magnesia, and 125 parts of finely crushed rosin, the whole being mixed together until a uniform white powder is obtained. If this powder is sprinkled over the whole surface of the belt while the engine is running at low speed, the belt will be prevented from slipping. The effect is attributed to the soda combining with the fat and oil in the belt, this action being facilitated by the rosin, whilst the carbonate of magnesia prevents stickiness.

LIQUID DEPILATORY

Sodium sulphide	14	parts.
Glycerine	20	"
Water	160	"
Rectified spirit	4	"
Perfume	1	part.

Dissolve the sulphide in some of the water; add the glycerine and mix. Add the remainder of the water and finally the perfume, dissolved in the alcohol, mix well and filter. The strength of this depilatory can be increased by increasing the amount of sodium sulphide but in no case should it exceed 10 per cent.

MUKH BILAS

Cardamom	100	parts.
Cloves	100	"
Cinnamon	100	"
Nutmeg	100	"
Mace	100	"
Cubeb	100	"
Catechu	100	"
Camphor	10	"
Musk	1	part.

Reduce the ingredients separately into fine powder and mix thoroughly. Put all the substances together in a mortar and make it a stiff paste with rose water. Bray well for some time. Take this and make it into small pills of 2 or 3 grains each and allow to dry in shade.

PHARMACEUTICAL RECIPES

ASTHMA HERBAL DROPS

Tinct. of stramonium	1 part.
Laudanum	1 „
Anise-ammonia	1 „

Mix.

Dose 10 to 15 drops in hot sugar water, ice daily.

LOTION FOR USE AFTER DEPILATORY APPLICATION

Acetic acid	2 oz.
Zinc acetate	16 „
Lavender Oil	2 „
Distilled water	100 „

Mix until dissolved; filter through gnesium carbonate or talc to clarify.

EXTRACTION OF SANTONINE

Take of wormseed, 4 parts; hydrate of lime parts; mix and exhaust them with alcohol 90%; distil off ¾ lbs. of the spirit and evapo .e the remainder to one half, which, at the iling temperature, is to be mixed with acetic id in excess, and afterwards with water; on ose, impure santonine subsides; wash this th a little weak spirit then dissolve it in recti- d spirit 10 parts, decolour by ebullitions for a v minutes with animal charcoal, and filter; filtrate deposits colourless crystals of santo- ne as it cools; these are to be dried, and pt in opaque bottles.

ULCER OINTMENT

Zinc oxide	175 gr.
Boric acid, finely sifted	175 „
White soft paraffin	3½ oz.
Hard Paraffin	2 „

Melt the hard paraffin and mix the soft raffin. Then remove from the source of heat. iturate the boric acid and zinc oxide until nooth and put in pots.

ANTI-RHEUMATIC LINIMENT

Capsicum	1 oz.
Oil of turpentine	1 pint.
Menthol	1 oz.
Oil of origanum	3 dr.
Oil of gultheria	1 oz.
Oil of camphor essence	1 pint.

Macerate the capsicum with the turpentine and then add the other ingredients one by. ie.

MOUTH WASH POWDER

Borax	1 oz.
Thymol	1 grain.
Menthol	1 „
Methyl salicylate	5 mins.
Eucalyptol	5 grains.
Oil of clove	2 mins.

Mix the flavours with a little alcohol and ray in the borax powder. Allow the alcohol to evaporate and pack the powder at once in glass bottles.

HAIR TONIC

Tincture of cantharidin	6 oz.
Quinine hydrochloric	1 „
Tincture of capsicum	2 „
Glycerin	3 „
Bay rum	6 gal.

Tincture of cudbear sufficient to colour.

TOOTHACHE ESSENCE

Menthol	2 drams.
Camphor	2 oz.
Chloral hydrate	2 „

Mix.

ANTIPHLOGESTIC PASTE

Kaolin	505.0 grms.
Boric acid	45.0 „
Thymol	0.5 „
Methyl salicylate	2.0 „
Oil of peppermint	0.5 „
Glycerine	387 „

Take kaolin and heat it to 110°C to drive off all traces of moisture and then allow it to cool and reduce to fine powder. Now mix the kaolin with the boric acid, and then thoroughly incorporate the warm glycerine, which has in the meantime, been rendered anhydrous by heating it for a short time to 100°C. Finally add the thymol, dissolved in the methyl salicylate and oil of peppermint, and make into a homogeneous mass. Preserve it in air-tight containers.

This mixture possesses emollient and antiphlogestic properties and is therefore largely used to allay inflammation in the treatment of pneumonia, boils, carbuncles, etc., and in dermatological practice.

MARCUSSEN'S OINTMENT

Potassium Hydroxide	22.5 grams.
Sublimed sulphur	12.5 „
Yellow soft paraffin	22.5 „
Wool fat	22.5 „
Zinc sulphate	2.0 „
Sodium hydroxide	0.8 „
Distilled water	51.7 c.c.
Benzaldehyde	0.5 „
Liquid paraffin to make	100 grams.

Dissolve the potassium hydroxide in an equal weight of water, and the sulphur, boil gently until dissolved, and mix the solution with the yellow soft paraffin and wool fat. Dissolve the sodium hydroxide in the remainder of the distilled water, and the zinc sulphate, shake well, and incorporate the mixture with the ointment then add the benzaldehyde and sufficient liquid paraffin to produce the required weight.

It is detergent and stimulant, and is used in ringworm, itch, psoriasis, and some chronic skin diseases.

—Recipes for Small Manufacturers

BLACK FLEXIBLE LEATHER VARNISH

A good varnish may be prepared as follows:—

Shellac	100	parts.
Gum sandarac	25	„
Venice turpentine	25	„
Pale rosin	25	„
Castor oil	20	„
Nigrosin (spirit soluble)	15	„
Methylated spirit	790	„

Place the ingredients in the methylated spirit and shake at intervals until dissolved. Lastly strain through linen and bottle for use.

DOG SOAP

Linseed oil	18	parts.
Caustic potash	4	„
Water	6½	„
Cresol	1	„
Rectified spirit		q.s.

Dissolve the caustic potash in water. Next warm the linseed oil on a water bath and slowly stir in the caustic potash solution. When the saponification is complete, add water if required. Then add a small quantity of spirit and cover the mass with a cup. Continue heating until the soap becomes transparent. Finally mix the cresol and set aside to cool.

LAUNDRY BLUE TABLETS

Ultramarine	6	oz.
Sodium carbonate	4	„
Glucose	1	„

Water a sufficient quantity.

Make a thick paste, roll into sheets and cut into tablets.

ARTIFICIAL LEMON SQUASH

Sugar	2	lbs.
Citric acid	1	oz.
Distilled Water	28	oz.

Dissolve and add the following, previously prepared:

Oil of lemon	½	dr.
Tinc. of lemon peel	1	oz.
Tinct. turmeric	½	dr.
Caramel	20	mins.

Shake up the tincture of lemon peel with oil of lemon occasionally during 4 hours; allow the oil to separate, decant the tincture and mix the latter with the other ingredients and filter.

VALVE GRINDING PASTE

Ammonium linoleate	10	parts.
Oleic acid	1	part.
Water	50	parts.
Green Silicon carbide	50	„
Powdered quartz	15	„

Mix. Keep wet while applying.

TABLE VINEGAR

Ginger	1	oz.
Pimento	1	„
Long pepper	2	„
Black pepper	3	„
Mustard	3	„
Vinegar	8	pints.

Bruise the spices and simmer gently in the vinegar for 10 minutes, cool and strain. The vinegar prepared in this way is used with any vegetable.

ADHESIVE POWDER FOR DRIVING BELTS

An adhesive powder for driving belts may be prepared from 1000 parts of powder soda ash, 375 parts of carbonate of magnesia, and 125 parts of finely crushed rosin, the whole being mixed together until a uniform white powder is obtained. If this powder is sprinkled over the whole surface of the belt while the engine is running at low speed, the belt will be prevented from slipping. The effect is attributed to the soda combining with the fat and oil in the belt, this action being facilitated by the rosin, whilst the carbonate of magnesia prevents stickiness.

LIQUID DEPILATORY

Sodium sulphide	14	parts.
Glycerine	20	„
Water	160	„
Rectified spirit	4	„
Perfume	1	part.

Dissolve the sulphide in some of the water; add the glycerine and mix. Add the remainder of the water and finally the perfume, dissolved in the alcohol, mix well and filter. The strength of this depilatory can be increased by increasing the amount of sodium sulphide but in no case should it exceed 10 per cent.

MUKH BILAS

Cardamom	100	parts.
Cloves	100	„
Cinnamon	100	„
Nutmeg	100	„
Mace	100	„
Cubeb	100	„
Catechu	100	„
Camphor	10	„
Musk	1	part.

Reduce the ingredients separately into fine powder and mix thoroughly. Put all the substances together in a mortar and make it a stiff paste with rose water. Bray well for some time. Take this and make it into small pills of 2 or 3 grains each and allow to dry in shade.

—IN THE FIELD OF INVENTION

METAL AMALGAMS

New to the chemical world is the utilisation of metal amalgams, i.e. metallic compounds containing mercury, in the manufacture of industrial chemicals. They are also useful in the separation and purification of other metals. The basis for the formation and utilisation of amalgams was discussed by R. B. MacMullin, consulting engineer of Niagara Falls, New York. Dr. MacMullin described new processes for the production of free metals such as sodium, potassium, zinc, lead and lithium. Caustic soda is produced by decomposition of alkali amalgams with free water and metal alcoholates by decomposition of the amalgams with a suitable water-free alcohol. Various metallic salts are produced by direct union of the metal dissolved in the amalgams with other metals and acidlike compounds to produce various chemicals.

P. V. C. FILTER CLOTH

Great improvements have been made in the last few years by introducing new types of filter cloth made from synthetic fibres. Among these are Redivin filter cloth manufactured by Rediweld Ltd. This is woven from unplasticised polyvinyl chloride filaments and fibres which have the external appearance of rayon.

The high chemical resistance of this cloth is claimed very often to permit simplification in manufacturing processes. For instance, an alkaline precipitate may be dissolved with acid directly on the filter without removing the precipitate to a dissolving tank. Washing of precipitates with highly concentrated reagents can also be carried out directly on this cloth which can be used for the filtration of a wide variety of liquids, for anode bags, and the separation of powders in suspension or emulsion.

Their resistance to corrosive agents also permits the use of Redivin textiles in the manufacture of protective clothing for the chemical and allied industries.

INTERNATIONAL CHEMICAL ENGINEERING

MIDGET MILL

A midget Atomill, made by British Jeffrey-Diamond Ltd., consists essentially of a casing or grinding chamber, which encloses a high-speed rotor mounted on the shaft of a ½ h.p. 10,000 r.p.m. electric motor housed within the casing of the machine. The grinding action is obtained by means of 12 hinged hammers attached to the rotor which drive the material against a serrated grinding liner. Material is fed to the grinding chamber by a feeder screw, operated by a handwheel. After being reduced to the desired size, the material then passes through perforated screens to the discharged through an opening in the base of the machine which is connected to a receiving bin by a canvas breathing bag.

An air intake is provided in the end cover for equalising the air pressure in the grinding chamber when the mill is in operation, and for introducing inert gas when reducing materials that are liable to develop explosive properties during reduction, or cold air when grinding low melting-point materials.

The unit can be completely dismantled in a very short time to facilitate cleaning, and all internal parts are heavily chromium plated to resist corrosion.

ACRYLIC RESIN EMULSIONS

Acrylic resin emulsions of the non-ionic type are becoming increasingly popular for formulation of grease-proof coatings and as binders for clays and in decorative colour coatings which must have good resistance to discolouration during ageing. Some desirable characteristics and properties of these products are described (Chem. Age, 1950, 62, 569).

Acrylic resin emulsions, suitable in the formulation of paper coatings, must have a 40 per cent solids content, sp. gr. 1.08 (25°C) and should be unaffected by acids, bases, salts and organic solvents. They must possess high mechanical stability with thickness, such as concentrated water-soluble polymers, e.g. sodium carboxy methylcellulose. They should be capable of being plasticized with other resinous compounds to increase the flexibility of the film, without affecting its ageing properties. Common additions include acrylic resin dispersions, nitric rubber latex, natural rubber and synthetic (neoprene and GR-S) lattices. The emulsion should be without effect and indifferent to common pigments such as chrome yellow, iron oxide, cadmium red, ultramarine blue, titanium oxide, carbon black, chrome oxide and organic red. A number of variables such as the degree of porosity of paper stock, maintenance of a proper balance of coating, viscosity and solids and proper control of bubble formation (by adding compounds like caprylalcohol) give successful coating.

It is possible to obtain continuous completely grease-proof coatings on 60 lb. patent board in one pass at coating weights as low as 1.9 to 2.4 lb./1000 sq. ft. Where a partial proofing against grease is desired, good results have been obtained at 0.9 lb./1000 sq. ft.; where the base stock is less porous, deposition of continuous grease-proof film is possible in one pass at weights of 1.5 lb./1000 sq. ft. When used as a binder for high or low grade clays in pigmented coating compositions for paper, acrylic resin emulsions improve the handling characteristics and stability of the coating dispersion. The emulsions may be modified with starch to improve flexibility and calendering and with casein to contribute superior resistance of the film to yellowing during exposure to ultra-violet light.

—JOURNAL OF SCIENTIFIC & INDUSTRIAL RESEARCH.

—FORMULAS, PROCESSES & ANSWERS

DYEING COTTON WITH CUTCH

1358 M.Q., Junagadh—Wants to know the methods of dyeing with cutch.

The general method of dyeing cutch on cotton is to dye a 10-20 per cent., share of cutch at boil for one hour and then allow the material to dye from a cooling bath for some hours. The dye bath also contains about 1-2 per cent. of copper sulphate. The material is then taken out, thoroughly squeezed and treated with about 2 per cent. of bichromate of potash at boil for about half an hour. The material is then washed and soaped. A deep red-brown shade is thus obtained.

Cutch may also be dyed on the mordant of aluminium tannate to give deeper brown shades. Cotton is steeped for some hours in 5-10 per cent. Myrobalan extract, squeezed and then fixed in a bath containing 2-3 per cent. alum. The material acquires yellow colour at this stage. The material after washing is dyed with cutch by the same process as described above. Material treated in this way and dyed with 10 per cent. cutch acquires a deeper shade which is fuller and brighter too. Such a process is economically advantageous and fastness of dyeings is equally good.

The materials after dyeing with cutch but before developing in the bichromate bath may be treated with a solution of lime to fix the catechu-tannic acid and then developed as usual. Such a treatment gives redder shades but are paler and not quite pleasing. However the process is worked for redder tones. When ammonium chloride is used in the dyeing bath containing cutch and copper sulphate bronzy-brown shades are obtained. Iron, alum in the developing bath gives dark brown shades. The bronzy-brown may be further deepened if stannic chloride and copper nitrate are used in the bath.

TEMPERING POWDER FOR STEEL

1392 H.D.C., Thoubal—Wishes to know recipes of tempering powder for steel.

I

Potassium ferrocyanide	30	parts.
Potassium nitrate	30	,,
Animal charcoal	30	,,
Aloe, powdered	1	part.
Gum arabic	1	,,
Sodium chloride	15	parts.

Mix.

II

Animal charcoal	24	parts.
Horn filings	4	,,
Glue	6	,,
Potassium nitrate	9½	,,
Sodium chloride	55	,,

Mix.

STANNOUS CHLORIDE

1398 S.D., Calcutta—Wishes to know a process of preparing stannous chloride.

To prepare stannous chloride dissolve granulated tin in concentrated hydrochloric acid, with the aid of gentle heat. The operation may be conducted in copper vessels, as the two metals in contact induce volatic currents which result in the more rapid solution of the tin. The liquid on being concentrated deposits crystals containing two molecules of water.

ALUMINIUM LEAD ALLOYS

1399 B.K.M., Serampore—Wants to be enlightened with the preparation of aluminium lead alloys.

These two metals unite only with great difficulty, and no useful alloys have yet been discovered.

SACCHARINE

1443 H.S.W., Alwar—Wants to know the process of making saccharine.

Saccharine is a compound remarkable for its sweetness. It is made from toulene, of which large quantities are produced in the manufacture of coal gas. The process which is a most complicated one, put briefly, is as follows:—

The toulene is treated with sulphuric acid, yielding ortho-and paratoluene sulphonic acids which are then converted into calcium salts and further into sodium salts by treating with sodium carbonate. The next step is to act on them with phosphorous trichloride and a current of chlorine, the product being a mixture of sulphuric chlorides.

These chlorides are separated by crystallisation. Ortho-sulphonic chloride being retained. The ortho-compound is next treated with ammonium carbonate and steam being thus converted into toulene—sulphonic inside, which by oxidation with potassium permanganate yields saccharine. It is generally estimated that sweetening power of saccharine is 300 times of sugar; if one grain of saccharine is added to a gallon of water sweetness is plainly perceptible.

PREPARATION OF DEXTRINE

1549 S.S., Kanpur—Desires to know a process of preparing dextrine.

In making dextrine the potato starch is homogeneously mixed with the water in which the nitric acid and a metallic catalyst are added. For every 100 grams of starch, 10 c.c. of water, 0.225 c.c. of strong nitric acid (sp.gr. 1.40) and manganese chloride equivalent to 0.02 manganese are employed. The equivalent wet starch is dried either in a drying chamber or in a pan heated by water at a temperature not exceeding 90°C. A higher temperature should not be used as the dextrinisation might start prematurely with the formation of bad clots. After the mixture is dry it is next sifted through a 40-mesh sieve and little clots

that may have formed are crushed and passed through the sieve. A free and homogeneous dry powder is obtained which will pass to the dextrine stage in its natural form.

The vessel for carrying out the dextrinisation is best made of copper having round and shallow shape with a flat bottom so that the starch can remain spread at the bottom of the pan. The copper pan should be placed inside an outer vessel made of sheet iron maintaining an annular space all round. The space between the pan filled up with a suitable heating medium like beeswax which will admit of easy heating to the temperature of dextrinisation without much disengagement of vapour. The bath should be heated and maintained at a temperature of 170°C. and the treated and dried starch is added to the pan and the starch is stirred with a copper trowel. During stirring it is essential that the mess should get continually mixed. The completion of the process approximately takes about 45 minutes to one hour which is ascertained by taking out a small spoonful of the product and adding to it 5 times its weight of water when a water clear solution having no cloudiness should be obtained. It should also be tested for full dextrine reaction with iodine solution.

Other starches, such as rice, potato, etc. may also be used in preparing dextrine.

HOT TINNING COPPER

1555 M.R.T., Lucknow—Desires to be enlightened with the process of tinning copper and cast iron.

Copper that is to be tinned by the hot dip process is usually fabricated into some form or other whereby it is covered with oil or grease. The first step therefore is to clean the copper articles previous to tinning. For this purpose the copper articles are dipped in a cleaning bath made of mild alkali solution. When the oil and grease have all been removed then the next step is to wash thoroughly in a hot water rinse at the same temperature.

When the work has been thoroughly rinsed, the next step is pickling. This is done in a mixture of nitric and sulphuric acids in the proportion of 1 gal. of 38° nitric acid, 1 gal. of 66° sulphuric acid, 1 gal. of water, and a little muriatic acid. When these acids are mixed, heat is generated and therefore, much care should be used. All acids, etc., should be kept in stoneware. The pickling tank is a small acid-proof brick tank with a hood over it.

When the work has been given the bright dip in the pickling solution, it is again thoroughly rinsed, and then dipped in a liquid flux of zinc chloride. In order to have a high quality finish, attention is called to the fact that the solutions must be kept clean. The tin pot is filled with good commercial Straits tin and the temperature of the molten tin is held at 500—520°F., depending upon the character of the work. The work when fully coated with tin is slowly withdrawn so that it will drain clean. When the piece has completely drained, it is then quickly quenched in a kerosene oil bath, cooled by a cold running water jacket.

The last step is drying the articles. This can be done in sawdust, and then if the articles are large, they can be wiped with soft rags. If small articles, they can be thoroughly dried in the sawdust, sifted and then blown with an air-blast.

HOT TINNING CAST IRON

As the hot dip tinning of cast iron castings is a very difficult matter, it is necessary to explain the cause of the trouble. The iron in making such castings often picks up sand. In addition to this feature, often cast iron is filled with graphite. Thus when any attempt is made to clean such castings, these two factors are difficult to overcome. Both very fine silica and graphite flakes or particles may be embedded in the surface skin of the castings, and when not entirely removed in the cleaning and pickling processes, the tin adheres as coating on a "greasy" surface. Thus to obtain a perfect tin coating on cast iron castings, all this fine silica and graphite must be entirely removed in the cleaning processes.

The most modern method of cleaning castings is by blast cleaning. This equipment, however, is expensive, and is used only where a very large production is available. The next best method of cleaning such castings for the very small plant is first to thoroughly sandblast the castings. This means that every corner and indentation has been perfectly sandblasted. In many cases, later coating troubles have been caused by not carefully cleaning the corners, and more difficult places. All rust should be entirely removed by the sandblasting. The next step is a thorough tumbling, when that is possible and practical, to obtain a smooth surface. Sandblasting gives a rough finish; tumbling will smooth this roughness off, and give a smooth surface for the tin to be deposited upon.

After sandblasting and tumbling, the next step is pickling. There is only one acid that will dissolve silica or the fine sand picked up by the iron from the runner, or from the moulds. This acid is hydrofluoric acid, commercially known as "casting acid". The castings should be given a light pickle for about 20 minutes to half an hour in a solution of one-half of 1 per cent. sulphuric acid and 2/10 of 1 p.c. hydrofluoric acid, at a pickle bath temperature of about 140°F. If this acid mixture does not absolutely clean the surface, then muriatic acid, which is stronger than sulphuric, can be used. Since this formula is giving satisfactory results no trouble should be encountered. If the pickling is done in a small tank of about 300 to 400 gallons of solution, it is cheaper to empty the pickle every night and make up a new pickle each day. This also gives better cleaning practice.

Tin melts at 449°F. The size of the tin bath, etc., size of articles, production, etc., will determine the exact tin bath temperature to use. About 475 to 500°F. should give a good finish. A good brand of Straits tin should be used in the tin pot. Sometimes much difficulty is encountered due to the use of hard tins. The

castings, if small, should be carefully withdrawn from the bath so no "run-off" or "drip" places are left. They are then quenched in a kerosene oil bath, with a water jacket around it to take up the heat. They are finally dried in sawdust.

BOTTLE SEALING LIQUID WITH CELLULOID

1520 S.R.I., Kakinada—Wants to have a good recipe of bottle sealing liquid with celluloid.

Waste celluloid films	300	grains.
Acetone	3	oz.
Benzene	1	"
Amyl acetate	2½	"

Cut the celluloid into small pieces and put into a bottle. Then pour the other ingredients and a few grams of spirit soluble aniline colour. Tightly close the bottle and keep aside for a couple of days. Shake occasionally during the period.

HANDMADE PAPER FROM WASTE PAPER

1556 M.M., Galia—Desires to learn the process of paper making from waste paper.

Paper making from waste paper is simply a process of conversion. Steep waste paper or old rags or mixture of both in a reservoir in which a small quantity of lime has been added. After a day or two take out the mass and squeeze out the water from it as possible. The whole mass is then subjected to the process of pounding. The operation is carried on with the help of an indigenous tread mill. This is the most laborious part of the business, and takes about 8 to 10 hours to complete. The mass is then kneaded until the whole is turned into a soft consistency. After this the mass is again soaked in diluted lime solution in which some sali-mati (Alkali) has been added for about 2 days, then washed in a stream of water holding it in a canvas screen. The washing is continued until the washed water is clean.

The pulp thus prepared is now mixed thoroughly with a large quantity of water containing in a large earthen tumbler. Now a fine sieve fitted in a wooden frame is dipped into this solution, in which the pulp is now suspended in a state of fine division and is carefully taken out. The sieve with the homogeneous layer of pulp on it is detached from the frame, turned over and lightly pressed against a sheet of paper. The sieve is then carefully taken away leaving the newly formed sheet of paper.

The sheet is now carefully detached and exposed to the sun to dry. When dried, it is trimmed and then sized with a thin layer of starch solution. This is then thoroughly dried. The paper is now stretched on a wooden board and rubbed with a cylindrical piece of stone, and is then ready for the market.

CARBON PAPER

1559 D.N.S., Simla—Wants to know the process of making carbon paper.

Lampblack	10	parts.
Olive oil	10	"
Ceresine wax	2	"
Petroleum ether	20	"

Rub the black and oil together in a mortar, adding the oil little by little, then put in a pan, and after heating it a little, add the wax. When this is melted and mixed, remove the pan from all fires and lights, and add the ether. Apply the mixture over the paper, and then place it to the oven for about 20 minutes, so that the mixture may thoroughly soak in. Take from the oven, and wipe off any moisture with a clean rag, then hang up to cool. Prussian blue may be added to the black to intensify it or to give a blue shade.

SUGAR FROM GUR

1598 D.C., Broach—Wishes to have a process of making sugar from gur and also a formula of insect spray.

The ordinary gur consisting of a mixture of sugar crystals and molasses is put in earthenware conical vessels with perforations at the bottom. If however the proportion of molasses in the gur appears to be above the average, it is advantageous to have a preliminary draining out of the molasses in split bamboo baskets before putting the gur in the earthenware pots as aforesaid. In the case of a new pot, it is necessary to cover the perforations with layer of crystalline gur in order to prevent the molasses passing out quickly and carrying sugar crystals along with them, and then to fill it up with the gur as such. As the molasses drain out the upper part of the contents of the pot dry up, choke the pores and form hard lumps. In order to prevent this, the top of the vessel is kept covered with a piece of wet cloth or gunny. After molasses has drained out as much as possible, which generally takes in the case of an average lot of gur 3 or 4 days, the contents of the pot are transferred to the centrifugal machine whereupon the molasses is removed and dry crystals of sugar are obtained. It has been found advantageous to finish off the operation by spraying a little water on the crystals and centrifuging the lot for a few minutes more. The water dissolves the film of molasses clinging to the crystals and leaves through the pores charged with molasses. This wash ensures the removal of the last traces of the molasses and soluble impurities and thereby improving sugar produced. The molasses collecting below the percolation pot and in the outer casing of the centrifugal machine is concentrated for further crystallisation in the usual manner and the process is repeated as long as crystals are yielded.

INSECT SPRAY

Petroleum spirit	35	fl. oz.
Pyrethrum extract	75	grains.
Sassafras oil	1¼	dr.
Methyl salicylate	5¼	"

Mix.

WEED KILLERS

1668 D.S.S., Sukrawar Santhi—Wants to have recipes of weed killer.

An alkaline arsenical weed-killer is made of:

Arsenious acid	16	oz.
Sodium hydroxide	16	,,
Water	120	,,

Boil until clear, then dilute to one gallon. This concentrated preparation is diluted with nine parts of water before using. Each gallon of a diluted solution is sufficient for 4 square yards.

A simpler method is the following: Dissolve 1½ lb. of granular caustic potash in 1 gal. of water in an open cask, and, by the aid of heat generated during solution, dissolve in the caustic liquid 2½ lb. of arsenic, added gradually in small quantities, and add colour. Dilute this concentrated solution to 25 gal. with water when required for use.

An acid weed-killer is made as follows:—

Arsenious oxide	15
Spirit of salts	50
Water	50

Boil together. When cool, dilute to 200 parts with water and add colour. For use, the finished liquid is diluted with 10 times its volume of water.

If small quantities are required, a coloured solution of sodium arsenate 1 lb., in water 5 gal., will provide an effective solution which can be rapidly prepared

Sodium chlorate sprinkled either dry or in solution, on garden paths at the rate of ½ to 1 lb. for every square yard, is a useful non-poisonous weed-killer.

ET BLACK INK FOR FOUNTAIN PEN

1620 C.M., Calcutta—Wants a recipe of jet black ink for fountain pen.

Nigrosine, water soluble	3	oz.
Blue aniline	4	dr.
Orange aniline	2	,,
Dextrine	1	oz.
Rectified spirit	2	,,
Distilled water, hot	1	gallon.

Mix, cool and filter.

SULPHONATED CASTOR OIL

1622 H.S.M., Gulbarga—Desires to learn process of making sulphonated castor oil.

Sulphonated castor oil or Turkey red oil or alizarine oil is prepared by acting upon castor oil at about 40°C with concentrated sulphuric acid. The treatment consists in running into the oil, slowly and with continued stirring, 20 per cent. of 66°Be sulphuric acid, the operation being performed in a lead-lined iron vessel kept cool by means of ice water. After leaving at rest for two or three hours, the mass is gradually thinned down with water and further diluted by stirring in a thin stream of luke-warm soda solution, about 3 times a crystallised soda to each measure of acid used being employed. The finished product settles out on being left over-night.

The product, which is either completely soluble in cold water or readily emulsifiable, is employed in dyeing.

The reactions which take place are complicated, and the sulphonated oil contains a mixture of several substances.

FOUGERE COMPOUND SCENT

Bergamot oil	15	parts.
Lavender oil	5	,,
Ylang Ylang oil	3	,,
Rose Geranium oil	8	,,
Oakmoss absolute	4	,,
Patchouli oil	1	part.
Vetivert oil	1	,,
Alpha ionone	6	parts.
Amyl Salicylate	3	,,
Rose oil	10	,,
Jasmin oil	17	,,
Tuberose	1	part.
Aldehyde CII	½	,,
Musk Ketone	3	,,
Heliotropin	2	,,

Mix by shaking. Keep in a closed phials for 15 days to mature. Shake every day for 15 minutes.

CATECHU

1634 B.J., Bezwada—Wishes to know a process of making catechu blocks.

Take 5 srs. of crude catechu lumps and pulverise them. Put the powder in a clean piece of rag folded twice. Tie up the four corners of the rag and suspend it over an earthenware vessel. Pour water in the vessel so that the catechu inside the rag may soak in it. Set the arrangement aside for 48 hours. The impurities of the catechu would have dissolved away by this time. Now collect the corners of the rag together, tie up, take away from the vessel and hand up to drain. When the dripping has ceased, spread the clayey mass over a plain of wood of the thickness of one inch and dry in the sun. When the mass has solidified a little, cut it up into squares 1 in. by 1 in. Finally dry the cakes until hard.

COLOURING BRASS

1668 K.P.E., Jamnagar—Wants to have a recipe of colouring brass articles and also tin printing.

Caustic soda	33	parts.
Water	24	,,
Copper carbonate	5½	,,

Dissolve the ingredients in the water and dip the well cleaned brass articles in the solution obtained. The intensity of the colour will be proportional to the time of immersion. After removing the articles from the liquid, rinse with water and dry in sawdust.

—READER'S BUSINESS PROBLEMS

[Reader's business problems will be discussed in these pages. We invite the reader to write us his difficulties. As the department is in charge of an experienced businessman who is specially adept in dealing with such problems and to whom experiences of a large number of successful businessmen are available, his replies will lead the enquirer to a successful career. These replies will be published in the paper only and cannot be communicated by post.]

CAREER OF A PHOTOGRAPHER

2253 D.M. Lahore—I am an amateur Photographer and take photos can I make living by it.

Yes, you can earn your living by adopting photography as your career. But you should not be afraid of hard work and do not mind leaving your home. You will have first of all to select some place—a district or sub-divisional head-quarters, preferably—for your sphere of work. We assume that you are already in possession of a camera and its accessories. If not you must equip yourself with them including a camera capable of taking at least "double cabinet photos", with an excellent lens and a painted screen to serve the purpose of a back ground. House rent in these places is generally cheap and will not present any great difficulty. Having secured your house your next business will be to print some handbills and distribute them throughout the town. Make it a point to mix freely with people of all sorts, without identifying yourself with any party politics to be generally met with in all mofussil towns. Let your conduct and bearing be above reproach, as like the physicians. You will have to come in close and frequent touch with purdah ladies in course of your profession. With the progress of work you might add bromide enlargement to your usual scope of business.

QUALIFICATION OF A SUCCESSFUL SALESMAN

1972 P.C.B. Calcutta—Writes, "what qualifications do you consider essential for a successful salesman?"

Before actually dealing with the subject I shall try to impress upon the mind of our readers what salesmanship is. Psychologically speaking salesmanship is evidence that convinces the reason and judgment; persuasion that stirs the feelings to action and whether verbal or written, the message is given in language that creates vivid concrete pictures in the imagination. Salesmanship is the power to convince. Salesmanship is the power or ability to influence people to buy at a mutual profit that which we have to sell but which they may not have thought of buying until we called their attention to it. An inclusive definition to salesmanship involves the idea of (1) mutual profit, benefit, and services; (2) ability to influence based upon scientific knowledge, fidelity to truth, effectiveness to presentation; (3) character that is aggressive and magnetic, and results in beneficient power over men.

A sale involves four factors; the salesman, the customer, the goods and the sale itself. The salesman to be successful, must have a strong healthy body full of vigour and nervous energy; a clear logical mind capable of accurate reasoning and a strong emotional nature that can feel and inspire enthusiasm.

The good salesman must know his goods their origin, structure, composition and usage he must know his customer, his nature and needs, that he may serve him as expert adviser for mutual profit.

Seven processes are involved in a sale, the introduction, the securing of attention, the rousing of interest, the producing of connection, the creating of desire, creating resolve to buy and the closing of the order.

The customer's interest or benefit must be kept foremost in every process of the sale.

The selling talk must be carefully prepared in accordance with the principles of salesmanship the line of argument must be clearly in mind; and the presentation must be made to the heart as well as to the head.

Well developed reason, imagination, judgment, and will are essential to the largest success.

The travelling salesman must be a travelling educator instructing his customers in the character and use of his goods, and in the best methods of selling them. Thus the sales to merchant, salesman and house will be increased and competition forestalled.

The greatest salesman is one who is thirsting after a broader knowledge and more thoroughness, who seeks to prove his method of expression, his vocabulary, his command of good English, courtesy, and cheerfulness, good appearance, right character and strong personality.

—BRIEF QUERIES AND REPLIES

Questions of any kind within the scope of Industry are invited. Enquiries or replies from our experts will be published free of charge in serial order. Questions are replied by post on receipt of As. 8 stamps for each question. Subscribers outside India are requested to send two International Reply coupons for each question. In order to facilitate the work of Editor's Department and to help prompt action the readers are requested to send enquiries in separate letters.

1862 C.R.R., Madras—Indigenous drugs may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcueta; Banga Lakshmi Bhandar, 13, Cotton Street, Calcutta, and Dawn & Co., 11, Portuguese Church Street, Calcutta.

1863 M.E.W., Ludhiana—You may consult illustrated catalogues of machinery dealers and manufacturers.

1864 B.F.D.S., Bombay—We have no book on food, colour and foam manufacturing.

1865 L.A.S., Bombay—You may keep the stone for 48 hours for maturing. You may also use sodium silicate as binding agent for grinding wheel. But it should be baked over slow fire.

1866 M.M.A., Kanpur—You may start manufacture of transfer picture. This is a good business and has good prospect.

1867 R.G., Ahmednagar—You better consult a physician for medicine for lucoderma. Melt the boot polish over waterbath and add a little turpentine oil. Indigenous herbs and drugs may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta; Dawn & Co., 11, Portuguese Church Street, Calcutta and Bengal Herb Stores, 2, Mullick Street, Calcutta.

1868 R.N.S., Poona City—We do no understand what you mean by silon lead and blue oil.

1871 N.M.A., Koothanallur—We have no book dealing with refining of silver. Process of refining silver will appear in Formula Section in due course.

1874 S.K.S., Khurda—Recipe of Keshar bilas appears elsewhere in this issue. Ingredients may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta.

1876 C.C., Sialkot City—Following is a recipe of lacquer for tin: Nitrocellulose 18 oz.; dibutyl phthalate 4 oz.; ethyl alcohol 9 oz.; methanol 9 oz.; acetone 36 oz.; butyl acetate 24 oz.; spirit soluble aniline dye 1 oz. Mix in a stoppered bottle. Keep aside for a day and then strain through cloth and bottle.

1877 R.L., Poona—Following is the process of deodorising white oil: Potassium permanganate 1 oz.; sulphuric acid ½ pint; water 3½ pints. Mix the acid and water and when the mixture has become cold pour it into a 2 gallon bottle. Add the permanganate and agitate until it is dissolved. Then add white oil 1 gallon, and thoroughly agitate. Allow the liquids to remain in contact for 24 hours, frequently agitate the mixture. Separate the white oil and wash in a similar bottle with a mixture of potassium permanganate ½ oz.; caustic soda ½ oz.; water 2 pints. Agitate the mixture frequently during several hours; then separate the oil and wash it thoroughly with water. On agitating the oil with the acid permanganate solution an emulsion like mixture is produced, which separates in a few seconds, the permanganate slowly subsiding and showing considerable reduction. In the above process it is quite probable that the time specified (24 hours) is greatly in excess of what is necessary, as the reduction takes place almost entirely in a very short time. It has also been suggested that if the process were adopted on a manufacturing scale, with mechanical agitation, the time could be reduced to an hour or two.

1878 S.I.D., Jamnagar—Process of manufacturing plastic solution and plastic cement will appear in Formula section in due course.

1880 S.B., New Delhi—We have no book on watch oil and paint manufacture. You may consult Manufacture of Disinfectants and Antiseptics published from this office, price Rs. 3/7/- including postage. For industrial books enquire of W. & G. Foyles Ltd., 119-125, Charing Cross Road, London W. C. 2.

1881 R.C., Delhi—Recipes of snows and creams will be found in April, 1950, issue of Industry.

1882 I.C., Bangalore—Napthalene balls may be had of Banshidhar Dutt, 126, Khengrapatty St., and H. Mumtaz & Co., 1, Colootola Street; both of Calcutta. Bottles may be had of Bengal Glass Factory, 106, Khengrapatty Street, and Calcutta Glass & Silicate Works, 9, Kundu Lane; both of Calcutta.

1884 B.N., Illegible—Your enquiry is not in our line.

1886 J.C.J.B., Jodhpur — An article on soap manufacture appeared in April 1950 issue of Industry. Soap materials may be had of Calcutta Mineral Supply Co., Ltd., 31, Jackson Lane, Calcutta.

1887 T.S.P.R. Eluru—Process of manufacturing ink powder will be found in April, 1950, issue of Industry.

1888 J.S.T., Bombay—Tablet making and sealing wax making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. Pin making machine may be had of Baird Machinery Co., Bridgeport, Connecticut, U. S. A.

1889 B.M., Patiala—For parts of cream separators write to Volkart Bros., 8, Netaji Subhas Road, Calcutta.

1890 S.N., Ghaziabad—It is very difficult to suggest names of purchasers of casein. You better advertise in newspaper.

1891 S.S.R.S., Nagpur—Formula of crackle paint will appear in Formula Section in due course.

1893 B.B.C., Lakhia—You may start a saw mill or a general workshop near Calol with Rs. 40,000/- to Rs. 50,000/-.

1894 A.M., Pettai—You may consult Soap Making by Dr. R. L. Datta, D.Sc., to be had of Laboratory Supply Ltd., 90, Chittaranjan Avenue, Calcutta.

1895 M.L.S., Bahraich—Process of testing ghee will appear in Formula Section in due course.

1897 M.S., Ambasamudram—For selling the goods you deal in you should advertise in newspapers of Burma, Malaya, Siam, Indo-China, Indonesia, etc. In manufactured goods profit should be 10 to 30 per cent. according to the demand of the goods. You have to prepare bamboo spikes of required design. You may use gum tragacanth as adhesive. Vernacular equivalents of the ingredients are not known. For industrial thermometer enquire of Adair Dutt & Co., Ltd., Stephen House, 4, Dalhousie Square, Calcutta.

1901 R.D.B., Nasik—Sewing needles are not manufactured in India at present.

1902 J. C., Adoni—Gum acacia may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta. For gum bottles enquire of Victoria Glass Works, 130, Mechua Bazar Street; Metro Glass Works, 147B, Raja Dinendra St., and Lucky Glass Works, 165, Lower Chitpur, Road; all of Calcutta. Process of manufacturing liquid phenyle will be found in Manufacture of Disinfectants and Antiseptics published from this office, price Rs. 3/7/- including postage.

1903 R.J.L., Calcutta—Process of manufacturing myrobalan extract will appear in Formula Section in due course.

1905 D.S., Jubbulpore — For printing machines write to the following firms: John Dickinson & Co., 6, Clive Row; Indo Swiss Trading Co. Ltd., P31, Mission Row Extension, Kent House, and Printing & Industrial Machinery Ltd., Windsor House, P14, Bentinck St.; all of Calcutta.

1907 B.G.D., Bangalore—You may consult Manufacture of Soap published from this office, price Rs. 3/7/- including postage. Soap making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

1909 B.B.C., Calcutta — For remitting money to foreign countries you should write to Reserve Bank of India for detail information.

1912 H.T.C., Hyderabad—Process of manufacturing milk powder will be found in November 1949 issue of Industry.

1919 S.L.B., Calcutta—We have no book dealing on knitting wool manufacture. For machine you may enquire of W. H. Brady & Co. Ltd., Mercantile Bldgs., Lall Bazar, Calcutta.

1920 S.P., Ranchi—For paper perforating, pounding and rolling machine enquire of John Dickinson & Co., 6, Clive Row, Calcutta.

1921 R.A.S., Baroda—Thread balling and bobbin winding machines may be had of W. H. Brady & Co. Ltd., Church Gate Street, Fort, Bombay. Enamelled photo printing colours may be had of Calcutta Photographic Stores & Agency Co., 154, Dharamtala Street, Calcutta.

1922 M.B.M., Hyderabad—Following is a formula of slate pencil: Powdered slate 60 parts; powdered limestone 60 parts; sodium silicate 10 parts. Knead together all the ingredients to form a plastic mass and then force it through metallic tubes of suitable diameter fitted with piston. Afterwards cut off into usual lengths and bake over a slow fire. For machines you may enquire of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

1923 N.D., Madhurai—Following is a formula of laxative chocolate: Castor oil No. 1 1 part; refined sugar 2 parts; chocolate powder 1 part; tincture of vanilla q.s. Incorporate the castor oil with the chocolate powder, add the sugar, with which the vanilla tincture has been thoroughly mixed. Work the ingredients well together in a fairly warm mortar and while soft place it in moulds or cut to desired size in a cold marble slab. Allow to cool and pack. Yes, you may use malted barley in malted milk.

1924 S.P.S., Rasulpur—For taking agency of cigarettes write to Imperial Tobacco Co. of India Ltd., Virginia House, 37, Chowringhee, Calcutta.

1926 W.A., New Delhi—For taking agency of manufactured goods you may advertise in Classified Bargain pages of Industry.

1932 N.J.V., Murtizapur—For cane write to B. C. Nandy & Co., 71K, Netaji Subhas Road, and Singapore Cane Manufacturing Co., 137, Canning Street; both of Calcutta. For brush enquire of Calcutta Brush Works, 16/C, Amherst Street, and China Brush Works, 64A, Mirzapur Street; both of Calcutta. Jute manufactures may be had of A. S. Soobashah Bros., 83, Netaji Subhas Road; Bengal Canvas Goods Mfg. Co., 4A, George Terrace, Hastings, and Birkmyre Bros., 8, Clive Row; all of Calcutta. Agent for Cuticura is Muller & Phipps (India), Ltd., Queens Mansion, Bastion Road, Fort, Bombay. Ink colours and other ingredients may be had of Imperial Chemical Industries (India) Ltd., 18, Strand Road, Calcutta.

1933 M.K.P.I.S., Palni—For anthracene enquire of Nadia Chemical Works, College Street Market, Calcutta.

1934 S.M.G.W., Firozabad — For button making machines enquire of Oriental Machinery Supply Agency Ltd., P12, Mission Row Extension, Calcutta.

1936 D.C.W., Narasimharajapura — Process of manufacturing chocolate will be found in Manufacture of Confectionery published from this office, price Rs. 3/7/- including postage.

1938 N.L.S., Ajmer—Following is a formula of duplicator: Gelatin 3 lbs.; water 13 lbs.; glycerine 18 lbs.; barium sulphate 7½ lbs.; sugar 3 lbs. Cut the gelatin in small pieces and soak for 12 hours in the water then add the glycerin. Heat gently on a water bath to effect solution and then incorporate barium sulphate and sugar thoroughly. Lastly pour into a suitable rectangular tin box.

1939 R.K., Bombay—Quince seeds may be had of Banshidhar Dutt, 126, Khengrapatty St., Calcutta.

1940 K.N.B., Jamnagar — For removing colours you may treat with bleaching powder and hydrogen peroxide. For bleaching hair you may apply hydrogen peroxide.

1941 B.S., Dehra Dun—Following is a formula of vinegar: Molasses 1 gallon; acetic acid 4 lbs. Put the ingredients together into a cask of about 40 gallons capacity. Fill it with rain water. Shake it up and let it stand from one to three weeks, and the result is good vinegar.

1942 S.C.A., Calcutta—For yarn you may enquire of the following firms: Balchand Bhawsinghka, 113, Monohardas Katra; Bansidhar Nandlal, 167, Harrison Road and Banwarilal Purshottamdas, 29, Banstolla Street; all of Calcutta. For fireworks enquire of Bonbonniere, P.O. Box No. 10827, Calcutta, and Orient Fireworks Co., 175B, Upper Circular Road, Calcutta.

1945 U.T.C., Shillong—Process of manufacturing turpentine and rosin appeared in November 1949, issue of Industry. For machine enquire of Volkart Bros., 8, Netaji Subhas Rd., Calcutta. You may start a factory at your place if raw material is available in large quantity.

1946 N.A.N.C., Darbhanga—For tractors write to Tractors (India) Ltd., Victoria House, Chowringhee Square, Calcutta. For fountain pen ink of foreign make write to Nilmony Halder & Company, 11, Chittaranjan Avenue, Calcutta, and Pen & Pencil Agency, 77, Harrison Road, Calcutta. Wants to be put in touch with the suppliers of egg powder.

1948 V.B.A., Vijayawada—For sodawater machine enquire of Essence & Bottle Supply Agency, 14, Radha Bazar Street, and Mukerjee & Sons, 3, Ezra Street; both of Calcutta. Silk yarn may be had of Bombay Silk Stores, D71, New Market, Toy Range, Calcutta, and Hiralall Seth, 16, Pageya patty, Burrabazar, Calcutta.

1949 B.I., Dowlaishwaram—Ebonite may be had of H. Banerjee, M.A., Post Box No. 2557, G.P.O., Calcutta; New Calcutta Stores, 62, Strand Road, Calcutta, and Universal Traders, 92, Harrison Road, Calcutta.

1951 G.T.C., Lucknow—For industrial and technical books enquire of Thacker Spink & Co. (India), Ltd., 3, Esplanade East, Calcutta and International Book House Ltd., Ash Lane, Opp. Clock Tower, Fort, Bombay. List of newspapers and periodicals will be found in Industry Year Book & Directory. Fancy phials may be had of Imperial Glass Works, 9, Ezra Street, Calcutta, and S. N. Paul & Bros., 186, Old China Bazar Street, Calcutta. Labels may be had of Sikri & Co., 55, Canning Street, Calcutta. Formula of sugar substitute is not available. You have to take permission for starting a periodical.

1953 J.T.C., Ilayangudi—Tin cans may be had of Bengal Tin Box Mfg. Co. Ltd., 1, Jadu Nath Mitter Lane, Calcutta, and National Sheet & Metal Works, Ltd., 36A, Sahitya Parishad St., Calcutta.

1955 U.S., Jullundur Cantt.—For water supply goods enquire of Bird & Co., Chartered Bank Bldg., Calcutta; Kennicot Water Softener Co. Ltd., 4, Fairlie Place, Calcutta, and Paterson Engineering Co. (India) Ltd., Post Box 680, 21, Theatre Road, Calcutta.

1956 S.N.K., Borivli—We have no book dealing with electric bulb manufacture.

1960 H.I., Darbhanga—No better formula of ringworm ointment is available.

1961 P.B., Ballia—Wants to be put in touch with the suppliers of hand blocks for

cotton and silk printing. Radio spare parts may be had of K. C. Dey & Sons, 161-1, Harrison Road; C. C. Saha Ltd., 176, Dharamtala Street, and Philips Electrical Co. (India) Ltd., 2, Heysham Road; all of Calcutta.

1962 A. C. K., Digboi—Machines may be had of Francis Klein & Co. Ltd., 1, Royal Exchange Place; Volkart Bros., 8, Netaji Subhas Road and Marshall Sons & Co. Ltd., 99, Netaji Subhas Road; all of Calcutta.

1963 M.C., Bombay—It is not possible to send a portion of our publication by post. You better buy the book. If you can send typing charge we can send you typed copy of the portion you require.

1966 N.I.V.R.W., Hubli—Rubber chemicals may be had of Naimuddin Bros., Akber Chambers, Mohamadali Road, Bombay 3.

1967 S.C.M., Rajkot—Process of manufacturing kimam appeared in May 1950 issue of Industry. You may add perfume to the agarbatti when in pasty condition. You may try the following compound: sandal oil 50 parts; patchouli oil 15 parts; cascarilla oil 30 parts; grain musk 5 parts.

1969 J.D., Nagpur—Process of making a duplicator appears under No. 1938 above. For re-inking typewriter ribbons you may treat the ribbon with the following ink: petrolatum 50 parts; lampblack or prussian blue 30 parts; petroleum benzine 10 parts; rect. turpentine oil 10 parts. Melt the petrolatum over waterbath and rub into it while hot the lampblack or prussian blue as much as it will take without becoming so dry as to be granular. When partly cool dissolve the whole little at a time in the mixture of petroleum benzine and rectified oil of turpentine. The finished mixture should be of the consistency of fish oil paint, when it will be ready for applying over the ribbons.

1977 T.N.S., Kanpur—Formulas of fountain pen ink appeared in April 1950 issue of Industry.

1978 J.P., Bikaner—Sugar making plants may be had of Burn & Co., 12, Mission Row; Jessop & Co. Ltd., 93, Netaji Subhas Road; Marshall Sons & Co. Ltd., 99, Netaji Subhas Road, and Western India Industries, 137, Canning Street; all of Calcutta.

1985 K.C.L., Khurda—For bleaching discoloured oil treat with bleaching powder and hydrochloric acid.

1986 M.P., Gorakhpur—For gas plant enquire of Andrew Yule & Co., Ltd., 8, Clive Row, Calcutta.

1987 Q.M.A.C., Allahabad—Following is a list of journals: Anglo-American News, published by American Chamber of Commerce in London Incorp., Aldwych House, 81, Aldwych, London C2; Annals of Science published by Taylor & Francis, Redhin Court, Fleet Street, London E.C.4; Australian Insurance Journal, Sydney; Weekly Times, Gladesville, Sydney; Auckland Chamber of Commerce Journal, Auckland, New Zealand: New Zealand Engineer, Auckland, New Zealand; Eve, Paris, France and Vogue, Paris, France.

1990 B.M.G., Silchar—Furnaces are cleaned stripped of the fibrous roots and heated gradually in earthen pots, the mouths of which are carefully closed by lids fastened with cowdung. The rhizomes are thus stewed in their own juice and freed thereby of the raw smell. Afterwards they are dried in the sun for nearly a week, being protected at night from dew.

1991 R.L., Calcutta—Process of making lemon juice will appear in an early issue of Industry.

1992 B.D.A., Azamgarh—You may consult Plastic Industry published from this office. For machine enquire of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

1993 S.H.B.S., Ahmedabad—DDT is not manufactured in India. It is an American product.

1999 J.E.W., Dhanbad—For tube boring machine enquire of T. E. Thomson & Co., Ltd., 9, Esplanade East, Calcutta and Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta.

2000 G.A., Lucknow—You have to adopt the general procedure of Import business. It is not possible to deal with the procedure in these columns. You better consult a book on import trade. You may consult Theory and Practice of Business Organisation by J. C. Mitra, published from this office, price Rs. 12. As regards other queries write to the Director General of Commercial Intelligence & Statistics, 1, Council House Street, Calcutta.

2004 I.B.P., Cachar—Following is a formula of sindur: Red lead 4 lbs.; Imitation vermilion 1 lb.; Venetian red ½ lb. Mix and pack.

2005 D.V.L.N.R., Guntur—Home Knitting in Telugu is not available.

2006 V.N.K., Poona—Tin cans may be had of N. A. G. Tin Factory, Ghaffer Bldgs., King Edward Road, Sewree, Bombay, and New Fakhri Tin Factory, 97, Dongri Street, Bombay. Glass bottles may be had of Agarwal Glass Works, 428, Kalbadevi Road, Bombay and Bharat Bottle Co., 157, Sheriff Devji Street, Bombay 3.

2007 J.W.C., Ajmer—Rubber latex may be had of K. C. Thommey, Kanjirapelli, Travancore, and K. V. Kurien & Sons, Mundakayam, Travancore. Casein may be had of Star of India Dairy Co., 12, Medows Street, Fort, Bombay, and Polson, Ltd., 65B, Dockyard Road, Malagaon, Bombay 10.

2008 P.B.G., Dhrangadhra—You should approach students, lawyers and businessmen for securing sufficient binding work. You may also do some agency business.

2009 N.K.S., Howrah—Small printing machines may be had of Maya Engineering Works. 36A, Russa Road, Calcutta and Oriental Machinery Supplying Agenly, Ltd., P-12, Mission Row Extension, Calcutta.

2211 V.C., Madras—Crown cork may be had of Crown Cork Mfg. Co., 1, Umakanta Sen Lane, Ghughudanga, Calcutta.

2012 U.T.C.I., Delhi—Shoe lace making machines may be had of Oriental Machinery Supplying Agency, Ltd., P-12, Mission Row Extension, Calcutta.

2016 J.C.M., Surat—It is not possible to deodorise spindle oil and use it as hair oil.

2017 E.C.F.I., Ambala Cantt.—For titanium dioxide enquire of Calcutta Mineral Supply Co., Ltd., 31, Jackson Lane and Calcutta Chemical Co. Ltd., 10. Bonfield Lane. both of Calcutta.

2018 S.M.S., Godhra—Pearliness of snow will appear on keeping for one month.

2019 P.B.D., Allahabad—For collodion and ether enquire of Photographic Stores & Agency Co. Ltd., 154, Dharamtala Street and Calcutta Chemical Co. Ltd., 10, Bonfield Lane; both of Calcutta.

2020 W.P., Warangal—Following is a formula of bread: Flour 20 Lbs.; Yeast 6 oz.; Salt 3 oz.; Alum 1 oz. First dissolve the salt in hot water and add to the flour. Mix the yeast thoroughly into it and set aside for 3 to 4 hours to ferment. Next dissolve the alum in hot water and add to the above. Knead the flour into a suitable dough. Put into moulds and bake.

2021 W.P., Warangal—For pulverising machine and oil engine write to T. E. Thomson & Co. Ltd., 9, Esplanade East, Calcutta and Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta.

2027 A.H., Faizabad—Formulas you require will appear in Formula section in due course.

2030 N.C., Bogra—All the chemicals and waxes may be had of Calcutta Chemical Co. Ltd., 10 Bonfield Lane, Calcutta and Banshidhar Dutt, 126, Khengrapatty Street, Calcutta. Ebonite rods may be had of Rubber Products Ltd., Dudheswar Road, Ahmedabad; Universal Traders, 92, Harrison Road, Calcutta, and New Calcutta Stores, 52, Strand Road, Calcutta.

2031 S.G.A., Hoshangabad—For toy making machine enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. Onion juice has some medicinal properties for which please consult a physician.

2032 A.H., Kamrup—Following is a list of jute mills: Adamjee Jute Mills Ltd., Stephen House, 5, Dalhousie Square; Hooghly Jute Mill, Garden Reach; Kedarnath Jute Mfg. Co. Ltd., 5, Madan Chatterjee Lane; Ludlow Jute Co. Ltd., 7, Royal Exchange Place; Luxmi Jute Mills Ltd., Belliaghata; Prabartak Jute Mills Ltd., 61, Bow Bazar Street, and Soorah Jute Mill, 102, Narkeldanga Main Road; all of Calcutta.

2034 G.S., Lucknow—Address of National Moulding Co. Ltd. is not known.

2035 C.M.M., Indore City—For securing a chemist advertise in newspapers. Process of refining cotton seed oil, groundnut oil, etc., will appear in Formula section in due course.

2036 I.L., Cachar—Tablet making machine may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. An article on ink manufacture appeared in April 1950 issue of Industry.

2037 R.K.D., Calcutta—Process of block making will appear in due course.

2039 B.C.P.W., Patiala—Process of manufacturing rose, jasmine perfume by synthetic process will appear in due course.

2040 M.P.S.M., Batala—Following is a list of advertisement agents: D. J. Keymer & Co. Ltd., 5, Council House Street; Calcutta Publicity Service, 65-2A, Raja Raibullav Street; Ideal Advertising Agency, 54, College Street, and A. C. Saha & Co., 48C, Durga Charan Doctor Road; all of Calcutta.

2044 V.N., Karnal—Process of manufacturing castor oil for edible and for toilet will appear in due course.

2045 S.K.G., Devada—There is no arrangement for imparting practical training in confectionery manufacture.

2046 A.R.T., Calcutta—Following is a list of silk ribbon manufacturers: South Indian Silk Ltd., Gudivatam, N. Arcot; Mysore Gold Thread Co. Ltd., Bangalore City; Amritbhai Jethabhai Mancherpura, Surat; Harkisondas Jamnadas Motiseri, Surat and Hiralal Balabhai, Limboosery, Surat.

2047 A.S., Lakhimpur-Kheri—Following is a list of tin can manufacturers: Bengal Tin Box Mfg. Co., 1, Jadu Mitter Lane, Shambazar National Sheet & Metal Works Ltd., 36A, Sahitya Parishad Street and Indian Colour Printing & Hollowwares Ltd., 243, Upper Circular Road; all of Calcutta.

2048 H.G.A., Oral—Address of High Commissioner for India is India House, Aldwych London W. C. 2. Following is a formula of benzyl benzoate emulsion: Benzyl benzoate 25 c.c.; Triethanolamine 10 g.; Stearic acid 50 g. Distilled water to make 1000 c.c. Dissolve th

Stearic acid in the benzyl benzoate with the aid of gentle heat, add the solution to a mixture of the triethanolamine and 500 c.c. of water, previously warmed to the same temperature. Shake until emulsified and then add sufficient water to make the required volume.

2049 C.L.U., Patiala—Following is a list of homeo and biochemic chemists: American Homeopathic Hall, 147/1, Bowbazar Street; C. Ringer & Co., Norton Bldgs., Lallbazar; Hahnemann Publishing Co., 166, Bowbazar Street; Economic Homeo Pharmacy, 61, Netaji Subhas Road and King & Co., 90-7-A, Harrison Road; all of Calcutta.

2059 H.H.S., Delhi—You may go through the Cloth Merchant section of Industry Year Book & Directory 1949-50 which you have already got.

2060 J.O.C., Bombay—Process of manufacturing artificial banslochan will appear in due course.

2061 E.T.C., Madras—Bucket making machines and electroplating plants may be had of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta. As regards technical expert you should advertise in newspapers.

2062 R.P., Malad—It is not possible to treat plastic buttons in such a way that these will not liquefy when being ironed.

2063 M.H.M.S., Bombay—We have no book on dye manufacture. For the book you may enquire of Thacker Spink & Co. (1933), Ltd., 3, Esplanade East; W. Newman & Co. Ltd., 3 & 4, Old Court House Street and Standard Literature Co. Ltd., 13/1, Old Court House Street; all of Calcutta.

2069 P.G.M., Cachar—We cannot vouchsafe opinion regarding respectibility of any firm. You better ask for bank and other trade references from the firm direct.

2070 A.P.M., Hazaribagh Road—Formulas of soap and ointment as required by you will appear in due course.

2073 P.B.L., Bareilly—Thread balling and reeling machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

2074 K.L.C., Mathura—You should consult a physician for ascertaining application of pharmaceutical recipes.

2075 M.I., Indore—Recipes of tailor's chalk appeared in May 1949 issue of Industry.

2076 S.B., Nagpur—Address of National Brush Industries is not available. Brushes may be had of Amherst Brush Factory, 12B, Amherst St.: Calcutta Brush Works, 16/C, Amherst Street; and Climax Brush Works, 64A, Mirzapur Street; all of Calcutta. A list of brush manufacturers will be found in Industry Year Book & Directory.

2079 G.M.N., Jaler—Plastic machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road and Francis Klein & Co. Ltd., 1, Royal Exchange Place; both of Calcutta. You may start plastic industry with Rs. 2000/- on a small scale.

2080 T.T.C., Bombay—Process of manufacturing battery separator appeared in February 1950 issue of Industry. Detailed information regarding battery plate and separator will be found in Manufacture of Batteries published from this office, price Rs. 3/7/- including postage.

2081 B.C.I., Kharda—You may use mottihari, hingli and Madras quality tobacco. You should follow the process exactly without making any change. As regards Tobacco Licence you should write to Cal. Excise Department.

2082 S.K.S., Khurda—Address of Deputy Registrar of Trade Marks is 17, Prinsep Street, Calcutta. You have to use industrial thermometer for ascertaining boiling temperature. Industrial thermometer may be had of Adair Dutt & Co. Ltd., Stephen House, 4, Dalhousie Square, Calcutta.

2083 C.K.J., Arrah—Following is a list of patent and trade mark agents: Dutta & Co., 82, Harrison Road; Law Morris & Co., 19, Strand Road, and Remfrey & Son, Stephen House, Dalhousie Square; all of Calcutta.

2085 E.M., Kurnool—Textile chemicals required enquire of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta, and Butto Kristo Paul & Co. Ltd., 1 & 3, Bonfield Lane, Calcutta.

2086 P.S.P., Gobichettypalayam—Process of manufacturing sodium hydrosulphide appeared in August 1950 issue of Industry.

2088 P.V.B., Alleppey—For glass cutters polishing machine, horns and boring machine enquire of the following firms: Fotic Lal Seal & Sons, 10, Swallow Lane; Kanay Lall Dhur, 11 Swallow Lane and Behary Lal Dey, 9, Swallow Lane; all of Calcutta. We have no book on the above subjects.

2090 N.C.C., Cachar—All the machines you require may be had of Small Machineries Manufacturing Co., 22, R. G. Kar Road; Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension and Kiron & Vinod, P7, Mission Row Extension; all of Calcutta.

2093 S.R.T.C., Kumbakonam—Formula of French polish will appear in Formula section in due course.

2094 C.I.L., Jalpaiguri—For button covering machine enquire of Kiron & Vinod, P7, Mission Row Extension, Calcutta.

[illegible] T.S.V.S., Muzaffarpur—Kelly's World [Dir]ectory may be had of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta. You [ma]y enquire of Govt. of India Central Book [De]pot, 8, Hastings Street, Calcutta for Govt. [Pu]blications. Refer your query to San Equip, [Mi]ssion Row, Calcutta.

2099 P.C.M., Coimbatore—Wants to be put [in] touch with the dealers in aloe fibre.

2100 D.N., Lakkidi—A formula of cashew [fru]it syrup will appear in Formula section in [du]e course.

2101 P.H.L., Kanpur—You may communi[ca]te direct with the party for particulars [re]garding the article he deals in. You may [wr]ite to the party with number and initials, care [of] Industry, when your letters will be duly [re]directed.

2102 N.V.R.B., Vizianagram—We are not [aw]are of any substitute for flour

2104 B.T.M.C., Lucknow—You should [ap]point some agents for selling tooth powder [m]anufactured by you. It is very difficult for us [to] suggest names of parties who will be interest[ed] in tooth powder. You better advertise in [In]dustry.

2106 T.S.S., Trivandrum—You should first [of] all bleach the conch with dilute sulphuric [ac]id solution, then polish with rag.

2107 G.I., Amritsar—For sheet metal work[in]g machine enquire of Alfred Herbert (India) [Lt]d., 13/3, Strand Road, Calcutta and Francis [K]lein & Co. Ltd., 1, Royal Exchange Palce, [Ca]lcutta.

2108 T.R.G.R., Salem—For jeweller's [en]amel and other ingredients write to Hamilton [&] Co. Ltd., 8, Old Court House Street, Calcutta.

2115 G.M.C. Bairamghat—Process of manu[fa]cturing cardboard will appear in due course.

2116 S.R., Calcutta—It will be convenient [fo]r you to manufacture distilled water which is [re]quired for manufacturing fountain pen ink. [Y]ou may use filter press for filling fountain pen [in]k.

2117 K.C.L., Khurda—In manufacturing [s]oap you may use mohua oil in place of tallow. [S]oda solution 44 Tw is equal to 26 Be. You may [e]xperiment on small scale for manufacturing [s]oap. The completion of the saponification can [a]lso be ascertained by the "ribbon test", as it is [c]alled. A quantity of the soap is taken on a [t]rowel and allowed to trickle down from it. If [i]n so doing the soap forms transparent ribbons, [i]t indicates that the saponification is almost [c]omplete. Grain forms after saponification. The [g]rained soap is then boiled with sufficient water. [T]he quantity of water required will depend [u]pon the quantity of grained soap. Sufficient quantity of salt should be added to the soap till graining is complete. When boiling soap it should be stirred from time to time with a laddle.

2118 K.S.B., Hissar—You perhaps want bone crushing machine which may be had of Marshall Sons & Co. Ltd., 99, Netaji Subhas Road, Calcutta.

2119 A.S., Ahmedgarh—Sheet metal working machines may be had of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta. Process of working the machine will be supplied by the machine suppliers.

2122 B.S.S., Haldwani—In making bread and biscuit you should use white flour. For manufacturing bread yeast is used to the flour and water. Fermentation commences in course of an hour or two, and the mass is seen to rise and fall. The ferment however may be left for six or seven hours and be still very good at the end of that time, but the common practice is to use it within 4 or 5 hours after its preparation. After this the ferment rapidly becomes sour.

2127 H.L.R.C., Amritsar—For packing and collapsible tube filling machine enquire of International Trading Co., 13, Netaji Subhas Road, Calcutta.

2128 A.N.C., Kokrajhar—Hosiery goods may be had of Kalighat Hosiery Factory, 231, Rash Behary Avenue, Calcutta; Kapoor Hosiery Factory Ltd., 8, South Sinthee Road, Calcutta; Pabna Silpa Sanjibani Co. Ltd., 5, Paymental Garden Lane, Calcutta; Borivli Hosiery Mills 63, Champa Gally, Bombay 2; Katrak Hosiery Works, 167, Lamington Road, Bombay 7; Oriental Knitting & Dyeing Mills, Ludhiana; Kishore Hosiery Factory, Ludhiana and Ideal Hosiery Works, Ludhiana. Biscuit may be had of B. C. Patel & Co., 143, Princess Street; Renown Biscuit Co., Connaught Road, Byculla, Bombay; Bombay Biscuit Co., 99-3, Canning Street, Calcutta and Standard Biscuit Co. Ltd., 47A, Chittaranjan Avenue, Calcutta. For patent medicine enquire of the following firms: British Colloids Ltd., 10, Graham Road, Ballard Estate, Bombay; Evans Medical Supplies (India) Ltd., Lakshmi Bldg., Sir P. Mehta Road, Bombay; Minerva Medical Stores, Mangaldas Road, Princess Street, Bombay; Krishna Medical Agency, 11, Colootola Street, Calcutta; May & Baker (India) Ltd., 11, Netaji Subhas Road, Calcutta; S. A. Rahman & Sons, 11, Colootola Street, Calcutta, and S. B. Biswas & Co., 55/42, Canning Street, Calcutta. Woollen yarn and woollen goods may be had of Kedarnath Kanhaiyalal, 17, Pagyapatty, Burrabazar, Calcutta, and Punjab United Trading Co., B23, College Street Market, Calcutta.

REVIEW OF BOOKS

EDUCATIONAL RECONSTRUCTION, by Dr. B. Kuppuswamy, M.A., D.Litt., Asst. Professor of Psychology, University of Mysore. Pages 203, price Rs. 2-8.

With the changes that are coming in the political and economic fields there is a conflict between the traditional system of education and the so-called progressive systems of education. According to the traditional method knowledge and truth are finished products which are merely to be assimilated while the progressive idea about education is that knowledge should rather be a process of discovery. The author therefore compiles in the volume a number of essays which survey the education problems that India confronts to-day and has to solve in consonance with her traditions and culture. The essays include educational ideals and educational reconstruction, language problem, the connection of heredity with education and the best institution for imparting education to the children.

The author who is a psychologist himself considers all the problems from a refreshingly new angle of vision and makes a broad survey of the educational needs of the present times so that the pupils may be best fitted by the system for the coming struggle for life. When an intelligence test of the boys is applied the author shows that the number of boys of extra-ordinary and more than average merit is found to be rather restricted. Hence in his opinion it will be sheer waste of money and energy to allow all boys irrespective of their abilities and propensities to continue for higher education. The boys should rather take up agricultural, industrial courses, etc. when they come of age as this will befit them all the more for the coming struggle of life. What is being done in foreign countries in such matter has also been indicated in the volume. The education of children has also been discussed in detail. The author strongly subscribes to the view that the little ones should be sent to nursery schools which should be not meant for preparing them for elementary schools but for stimulating the child and for bringing about a co-ordination of the individual sensori-motor nerves. The mental development of a child has been analysed in this connection and the scheme of work for nursery schools has been adumbrated. The book will be helpful to all who intend to assure the educational problems of India.

TREES, THE YEAR BOOK OF AGRICULTURE, 1949. Published by the United States Department of Agriculture. For sale by the Superintendent of Documents, Washington, 25, D. C. Pages 944.

The annual publications brought out by the United States Department of Agriculture have already made a name on account of wealth of information these contain. The 1949 volume is solely devoted to the various aspects of trees, their planting and trade. Although trees are the best friends of men and are the links which bind the earth and sky, the great part played by them towards national and individual prosperity, security and happiness is lost view of. Besides providing man with food and shelter, the first essentials of life, trees protect men from storms and heat of the sun, benignly influence climate and rainfall, and serve as a powerful tool to control erosion and floods. It is encouraging to learn that this year the Government of India specially observed a Tree Planting Day. In U. S. A. an Arbor Day is observed every year which is a date set apart by law in U. S. A. for encouraging the planting of shade and forest trees, along highways and public parks.

The volume under review is a stupendous work consisting of 944 pages, dealing exclusively with trees, wood, timber, forests, etc., from all aspects. It is a symposium of contributions from experts in the line. Beginning with a physiological study of trees and their association with man, the book discusses from practical point of view the kinds of trees most suited for the country homes under different climatic conditions with instructions on planting and keeping them healthy and protecting them from insects. The volume then proceeds to silviculture which is a subject that deserves greater attention than hitherto paid to it. There are elaborate details about selection of seeds, planting, breeding of trees, etc., both on a small scale for a small wood-land and also for forests. Detailed particulars are given about the forests in the different parts of U. S. A. and also for arboretums with fine collection of rare specimens for the amateur collector. Next chapters deal with the Diseases and Insects and their Control, and Protection against breakout of fires in forests and ravages from wild life. Cutting of timber

and logging and preservative treatment of wood have also been dealt with in detail.

CONVERSATIONS OF GANDHIJI, by Chandra Shanker Shukla. Published by Vora & Co, Publishers Ltd., 3, Round Building, Kalbadevi Road, Bombay 2. Pages 134, price Rs. 3/-.

The book under review is a record of the conversations which Mahatma Gandhi had with various prominent leaders and workers during 1933-34. The author of the book who was Gandhiji's Secretary at the time kept a record of the talks which are now being published for the first time. The talks relate to a varied range of subjects like untouchability, harijan service, God and Truth, Caste and Varna, Swadeshi, Change of Faith, Fasting, etc., etc., and incorporate the views of Gandhiji on these matters. These will be immensely valuable to men who want to study the life and teachings of Gandhiji. The most outstanding conversation embodied in the book is that in connection with the statement issued by him at that time suspending Civil Disobedience and restricting it to himself. The conversation that took place with leaders like Dr. Rajendra Prasad, Dr. Ansari, Shri Bhulabhai Desai, Dr. B. C. Roy on the eve of release of this momentous statement is an index to the political undercurrents of the times. It was at that time that public enthusiasm for going to jail was rather cooling down. Gandhiji considered it impracticable to carry on mass civil disobedience in the prevailing circumstances and instead of recalling it altogether, decided to reserve it for himself only. The reasons for his doing so were given in course of the talk and in the words of Dr. Ansari, Gandhiji had explained things as a specialist would explain from all points of views. It was thought that this decision would enable the countrymen to organise the country in other ways. While entertaining an unquenchable faith in civil resistance he was inclined to the view that all sections should be free to work in all directions towards national freedom in their own way without criticising one another. It was at this time that the revival of the Swaraj Party was under contemplation and the question of Council Entry thickened the air. Gandhiji was at that time questioned on almost all subjects and hence this topic also came up for discussion. The book thus contains valuable historical accounts of the political movements during that eventful period.

ACKNOWLEDGMENT

1. Report on the Work of the India Government Trade Commissioner for Ceylon during 1948. Issued by Director-General of Commercial Intelligence and Statistics, 1, Council House Street, Calcutta.

2. Report on the Work of India Government Trade Commissioner for Canada and Newfoundland during 1948. By M. R. Ahuja. Published by the Director-General of Commercial Intelligence and Statistics, 1, Council House

NOTICES & REVIEWS

(Manufacturers sending specimens and samples of their products for notice and review may please note that no notice is published of medical preparations and allied substances in this section.)

PAMPHLETS

We have the pleasure to receive a few illustrated pamphlets and bulletins from the Royal Egyptian Embassay, New Delhi giving a vivid idea about the progress of modern Egypt in respect of education, social welfare, culture etc., etc.

MAHAPURUSHA SIVANANDA (in Bengali)

Swami Sivananda was one of the chosen few who had the fortune of sitting at the foot of Sree Sree Ram Krishna Paramhansa Deva of revered memory and receiving religious instructions from his very lips. It is understood from the book that spiritual power was communicated to the Swamiji while still in his teens direct by Sree Sree Ram Krishna as in the case of Swami Vivekanada. From that time Swami Sivananda passed an inspired life in penance, devotion and spiritual ecstasy. His life is rich with glorious spiritual experiences and combines a surging spirit of jnana and tapasya with a genial urge for devotion and service towards humanity. His was an eventful life, dedicated to the cause of the dessimination of the teachings and ideals preached by the Saint of Dakshineswara. He came to be the Chairman of the Ram Krishna Math, Belur in 1922 after the passing away of Swami Brahmananda and carried out the responsibilities attached to the post with a high spirit of service. The book in Bengali by Swami Apurbananda who belongs to the Same Order presents a fine biographical sketch of Swami Sivananda and his work and teachings. The book also throws interesting side-light on the contemporary workers of the Ram Krishna Math. The book is published by Udbodhana Karyalaya, Udbodhan Lane, Calcutta 3, and is priced at Rs. 3-8. Pages 382.

TRADE ENQUIRIES

(To communicate with any party write to him direct with name and address given below mentioning Industry).

2065 Bhanwerlal Daysua, Sambhar Lake, Rajputana—Wants to be put in touch with the dealers in peacock feather.

2293 Jiwan Batta, 26, D. R. Road, Dehra Dun—Wants to be put in touch with the suppliers of feathers of birds.

2296 Govardhan Ch. Pattanayak, Mission School, Cuttack—Wants to be put in touch with the suppliers of the following fowls: Rock Cochins, Brahmas, Langshan, Wyandotte, Ansel, Malayas, Ghaghus, Bantams, Orpington, Silkies, Minories, Turkeys.

2019 B. S. Mahboob, Clerk, Accts. Dept., M. & S. M. Ry., Hubli—Wants to be put in touch with the supplier of dhupa fat, Nahor oil, Punnal oil, Kusum oil, and vegetable tallow in Bombay Presidency.

2374 Delhi Rubber Works, Opp. Faiz Bazar Police Station, Delhi—Want to be put in touch with the manufacturers of cardboard boxes with tin tops and bottoms.

INDUSTRY PUBLICATIONS

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EDITORIAL CONTENTS FOR

DECEMBER, 1950

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Last day of accepting advertisement is the 10th day of the previous month. Any order for alteration or correction of copy is not entertained after that day.

Advertisement rates for ordinary and special position, both casual or contractual, are sent on request.

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All enquiries regarding industrial or business information should be addressed to the Editor. Contributions and articles for review and notice should also be sent to him.

All enquiries regarding the Subscription or Advertisement Departments should be addressed to the General Manager.

OFFICE HOURS.

Editorial Department 11 A.M. to 4 P.M. on weekdays and 11 A.M. to 2 P.M. on Saturdays.

Subscription and Advertisement Department 10 A.M. to 5 P.M. on weekdays and 10 A.M. to 2 P.M. on Saturdays.

—CLASSIFIED BARGAINS

ADVERTISEMENTS under this head of small announcements cost 4 As. per word, minimum Rs. 3 payable by Postage Stamp or M.O. with order. No vouchers given.
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EDITOR :

K. N. BANERJEE.

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INDIA'S ECONOMY.

THAT something is wrong in India's economy is evident from the manner things are taking shape. The inflationary forces are still at work, and the price spiral still continues to move up. There is a wide gap between the production and consumption of foodstuff in the country and the gulf instead of being bridged is further widening as an after-effect of natural calamities. The all-out drive for food production has fizzled out. Our major industries, viz., Cotton and Jute, cannot work to their full capacity on account of shortage of raw materials in the country. Import and export restrictions, controls, priorities in transport stand in the way of normal trade. Marks are evident of complete collapse of Indo-Pakistan trade. Business is narrowing down. And instances may be multiplied in like manner.

The crux of the whole show in our opinion is the food and cloth problem of India and if this is liquidated properly, the other problems will be easy to solve. Deficiency of food like a double-edged sword is affecting our economy two-ways. It fully maintains the price of food-grains in the country, which even shows a tendency to go up in places not covered by rationing system. It also necessitates the heavy imports of food-grains which further deplete our rapidly dwindling foreign resources and greatly exhaust the meagre dollar resources of India. Coupled with this the soaring price of cloth seriously disturbs India's economy. Price of food and cloth being the determining factors in fixing the prices of other commodities and the index of living, their ascendant tone has a serious reaction on the prices of other commodities which sympathetically go higher to the great inconvenience of the mercantile people and the public as well.

Instead of flittering away her resources in a planless manner for the stability of India's economy, we consider it would be wise on the part of the Government of India to first devote pointed attention to the solution of the food and cloth problem, not in a paper-manner as hitherto done but in a practical way. We full believe that this being done, the other problems will be automatically solved and India's economy will once more be placed on a sound footing.

HOSIERY INDUSTRY IN WEST BENGAL

The hosiery factories in West Bengal are about 430 in number which are equipped with 3000 knitting machines. The actual number must be bigger than this for the small factories not falling directly under the Indian Factories Act have not been included in the list. The sock making factories which are also not counted in the above list, are about 250 in number. Hosieries are made by a big number of sewing factories as well which buy knitted fabrics from the market and process it into vests and other articles. The industry as a whole has a capital outlay of about Rs. 3 crores and provides employment for about 10,000 people.

It is understood that the total yarn requirements of these units is estimated at 100,000 cases of 200 lbs. each per annum. The internal monthly demand of West Bengal is about 9000 cases and the balance of the output is intended for the markets outside the State. The influx of refugee hosiery factories in West Bengal, many of which have received financial assistance in the shape of loans from the Rehabilitation Committee to start work immediately, further increases the quantity of yarn required for the industry. But it is regretable that the supply of the yarns in recent months have been quite inadequate for the purpose. In fact the factories could hardly work 25 per cent of their capacity upto last August, the monthly allocation of yarn for the State being only 1,857 cases. It was increased later on to 3,263 cases, but the average monthly receipt hardly exceeded 6500 cases. It is upto the Government to take into consideration these facts and immediately take steps for the enhancement of the allocation of more yarns so that the output of the industry is not hampered in any way.

STATE-OWNED COMPANIES

There are six important State-Owne and State-Controlled factories in Indi These are the Hindustan Aircraft Factory Sindri Fertilizer Factory, The Penicilli Factory, A Cables Factory, A Machin Tool Factory under construction, and th pre-fabrication factory in New Delhi. Th subject of management of these factorie in an efficient manner came up for discus sion before the Economic Committee c the Government of India. After due consi deration of the pros and cons, the Com mittee has come the conclusion that th State-Owned industries in India should b run after the system of company manage ment because the latter system is condu cive to greater efficiency in running th factories, to imposition of better disciplin among employees and to making expedi tious decisions by the managements i regard to emergent developments. Detail of the scheme are not yet available bu broadly it seems that the scheme envisage the creation of a board of directors fo each company whose Chairman will be a employee of the Government of India. I some cases, it is further porposed to invit private capital. In all cases however th Government will continue to hold a pre dominant share in, and control of all State owned and partially-owned industries. W welcome this change in the mental equi page of the members of the Committee. I seems that they are gradually shakin off their bias towards idealism whic appears to be further receding the mor the Government runs after it and are turn ing the practical side of things. The ma nagement of big companies by State, it wa hoped, would bring in the entire profit of the concerns to the coffers of th State. But in fact the management bein left in the hands of State officials, who ar

adepts more in State affairs than in practical business which demands specially attainments for success in the line. the concerns have not got much chance of coming out profitable at all. Hence the decision of inviting businessmen for their management, keeping the final hold in the Government's hand, is of course a step in the right direction. This is likely to infuse fresh blood in the management which will highly strengthen the administrative organisation of the above industries. Another side of the shield is that it will assure the businessmen who are still hesitating that the Government is slowly discarding its fancy for rationalisation and State ownership, at least in the present stage of India's industrial development.

MARKETING OF MILK IN INDIA

A Report on the Marketing of Milk in India just issued by the Agricultural Marketing Adviser to the Government of India draws special attention of the Government to the fact that adulteration of milk is nowhere in the world so widespread as in India. The position has become so serious that the consumers in India have become almost indifferent about the quality of milk. There is a strong feeling in the country that official control over the quality of such a vital foodstuff as milk is not as strict as in foreign countries. 9% of the milch cattle being located in the village and speedy assembling, long distance transport and large scale processing being yet undeveloped, the country's fluid milk is generally confined to the areas of production and is converted to ghee. Whatever milk is produced in and around urban areas is produced at high cost in congested stables under very unhygienic conditions. Hence to make milk available in urban areas from village centres at reasonable rates, provision should be made of concessional freight rates and other facilities by railways, if long distance transport of milk is to be promoted. Efforts have been made to arrange supply of wholesome milk to urban centres through the instrumentality of Producers' Co-operative Societies and Unions but the part played by them is yet exceedingly small. Transfer of milch cattle to essential areas for milk production, developing *gowshalas* as centres for milk production, better feeding and management of cattle, strict quality control and organized collection and distribution of milk are some of the steps stressed in the report for increasing milk production.

ALUMINIUM INDUSTRY

The importance of aluminium as an ingredient for various arts and industries is widely recognised. Besides being employed in the manufacture of alloys for the fabrication of light and durable sheets for aeroplane body it has now-a-days found its way in domestic life in various shapes and forms. Manufacture of aluminium ware from imported alminium sheets got a firm foothold in India some years ago. Manufacture of aluminium sheets, slabs, circles, etc. from natural ores is of recent development in India.

At the present moment two important companies are engaged in the manufacture of virgin aluminium in India. These are the Indian Aluminium Company and the Aluminium Corporation of India. It is understood that two more factories viz: The National Aluminium Company (Madhya Pradesh) and the Singha Aluminium Company (Mysore) are under construction and will be shortly running into production. The production by the two factories during the 1948-49 were between them as follows:—Alumina 6,483 tons, ingots 3,613 tons, sheets 2,584 tons.

It is therefore discouraging to learn that under the present system of subsidy extended to the industry the production of the two companies have received a setback. The main bottleneck in the production of metallic aluminium in this country in the case of both these companies has been the lack of adequate power. A public enquiry has lately been inaugurated into the claim of the aluminium industry for protection. Other important issues to be taken up by the Tariff Board are the possible demand in the next three years, cost of production, idle capacity of the plants and the like.

INDIAN ELECTRICAL INDUSTRIES

The electric industry in India covers a vast and varied range from ordinary ceiling roses to big turbines. It appears from the table of installed capacity and production of various units of the industry e.g. electrical motors, dry cells, motor car batteries, conduit pipes, transformer etc. submitted before the Third General Meeting of the India Electrical Manufacturers' Association that the production of most of these units in the first half of 1950 revealed a disappointing picture as compared with the installed capacity. The production of motor car batteries, transformers and V. I. R. Cables showed satisfactory increase while that for dry cell, electric motors, bare copper cables wire and winding wires showed remarkable decrease. The first and the foremost of the problems in the way of development of electrical industries is an acute shortage of raw materials, which has been further aggravated by defective working of the machinery of import control. Important raw materials such as electrical sheets, ball-bearings and D. C. C. wires required for the industry are indigenously available but there is a dearth in the market of insulating materials and good varnishes which are indispensable for progress of the electrical industry. [It is] therefore very necessary that [...] efforts be made in India to produce t[hem] on an organised basis in India. [The] industry is faced with lack of or[ders] partly due to heavy imports of elec[tric] motors in 1948 and 1949 when imp[orts] were liberalised. In the case of electr[ical] accessories, domestic appliances and [con]duit pipes, the industry again can[not] compete successfully with the fore[ign] products. Hence for the proper gro[wth] of the electrical industry in India it is [of] the highest importance that the electr[ical] manufacturers improve their quality [of] production by standardisation of their p[ro]ducts according to the recommendati[ons] made by the Indian Standards Institut[ion] and by introducing a quality control te[ch]nique in production process.

INDIAN STANDARDS FOR INKS AND INK POWDERS

Though considerable quantities of i[nks] and ink powders are being manufactu[red] in India at present, in view of the sm[all] units in which the industry has been [or]ganised and their wide dispersal all o[ver] the country, the quality of the produ[cts] has not always been uniform and of [a] desirable standard. In order to assist [the] manufacturers in this regard, the Ind[ian] Standards Institution, New Delhi has n[ow] issued four Indian Standard Specificati[ons] for inks.

The standards cover blue black a[nd] red in powders and tablets (IS: 2[...] 1950), blue black superior fluid ink [for] writing (IS: 222-1950), blue black a[nd] red fountain pen inks (IS: 220-1950) a[nd] fluid ink for registration and for chequ[es] and records (IS: 221-1950). In all th[e] standards, definitions of terms used in t[he] trade, the form and composition of [the] material used in the manufacture of i[nks]

and the requirements of the products in respect of solubility, chemical analysis, corrosion, keeping and writing properties, have been specified. Standard methods of packing and marking have also been included.

INDIAN FAN INDUSTRY

The history of the Indian fan industry is characterised by steady development. The importance of electric fans manufacture can be appreciated from the fact that the total value of Indian production is of the order of Rs. 3 crores.

Though the better class of fans now being manufactured are as good as the best made in any other country, it was considered very necessary, not only in the interest of the users but the industry itself, to regulate the quality of fans through standardisation. The Electrical Plant and Switchgear Sectional Committee of the Indian Standards Institution has, therefore, issued a draft Indian standard specification for electrical ceiling fans.

The general requirements for design and construction have been prescribed, the sizes have been rationalised from 36 to 48 inches and the limits of temperature rise on continuous running laid down. The most important feature of the specification is a table which lays down minimum standards of performance, including the minimum total air to be delivered by each type and size of fan. To further ensure satisfactory and economic design, minimum service value, which is the ratio of the air delivered to the power consumed, has been stipulated, along with minimum peak velocity on which the cooling effect of the air depends. Methods of tests have also been included.

The project for the standardisation of table fans is also receiving active attention.

It is hoped that this standard will assist in regulating the industry on efficient and healthy lines and will also ensure that fans complying with this specification serve their purpose satisfactorily.

RAILWAY FACTORY AT ONDAL

A factory for manufacturing und frames for wagons and coaches is goi to be started in Ondal in the district Burdwan in West Bengal. The selecti of the site seems to be based on the nea ness of the Chittaranjan Locomoti Works at Mihijam, just started for t manufacture of locomotives in India. T factory is estimated to cost Rs. 60 to R 70 lakhs and is expected to function ne year.

IMPORT CONTROL

The attention of Indian importers a manufacturers is drawn to the followi notification regarding marking of certa imported goods on and after the 1st Ap 1951. The following articles shou have applied to them in the English la guage on importation and at the time sale, whether by wholesale or retail, indication of the country or place in whi they were made.

Where such goods are made or pr duced in one country and packed in co tainers made or produced in another, t indication shall specify such countries one or both of them are beyond the limi of the States. Where such goods a partly or wholly made or produced in o country and partly made or produced finished or processed or embellished completed in another country or oth countries there should be indication "Made abroad" or "Foreign Made" "Manufacture of different countries ou side India." Where such goods are pr duced in a foreign country but processe or embellished in India the country origin and the words "Processed in India should be indicated. Where due to smal ness of the size of the goods it i

impracticable to mark the country of origin, on the goods themselves or where it is not possible to do so without adversely affecting the quality of the goods, the indication may be applied on the wrapper, container or label attached.

Apparatus and appliances, Glass. Bulbs, globes including electric incandescent bulbs. Electric cells and batteries. Fountain pen barrels. Chemicals, drugs. Cigarettes. Fents. Lanterns. Machinery Piecegoods. Stationery goods, Tiles, Timbers and manufactures thereof. Toilet preparations. Logs, planks, Yarns, Iron ingots, etc.

AID TO INDUSTRIAL CONCERNS

We had occasion previously to refer to the activities of the Industrial Finance Corporation of India, constituted some years back. According to the second annual report of the Corporation it appears that the Corporation received 65 proposals for accommodation during the year ended June 30, 1950. The amount of assistance applied for aggregated Rs. 8¾ crores. Out of these 44 applications aggregating Rs. 4.31 crores have been rejected. The Corporation has sanctioned Rs. 3.77 crores to 23 industrial concerns only.

—METALLISING PLASTIC

IT is sometimes desirable or necessary to coat the surfaces of plastic components with metal for screening of electrical interference or for the purpose of decoration. From the engineering point of view the former reason will be of much interest than the latter, although cases do occur where it may be desirable to produce metallic effects for reasons of decoration.

In this article it is proposed to describe the processes of metal coating of both thermo-plastic and thermo-setting materials and to some extent the types of apparatus employed for the deposition of metallic coatings.

METHODS

There are two methods which can be used to obtain a metal covering on plastic components, namely:

1. Electroplating
2. Metal spraying

Before actually dealing with the processes let us briefly describe the type of screening necessary for electrical interference especially in radio.

RADIO SCREENING

The high frequency electrical discharges which occur in certain types of equipment cause serious interference with radio reception. If such equipment is used in the vicinity of radio-receiving apparatus, it is essential that the high-frequency discharges shall be suitably screened. This means that the equipment from which the interference emanates must be totally enclosed in a metal box which is connected to earth. In this way the effect of the discharges is nullified. To obtain electrical screening it is necessary to surround the source of the interference with a metallic box. In practice this cannot always be conveniently arranged, and this is particularly true when it is necessary enclose the electrical apparatus in a mou ed plastic casing. In such cases it becon necessary to provide the metal box w a continuous metal film and attach this earth.

Numerous tests have been carried (to determine the efficiency of metal co ings on plastic materials as compou with pure metal, and it is now accept that the metallised plastic provides equally good a screen as the pure met

ELECTROPLATING

The process of electrodeposition plastic components has been develop with a view to obtaining metal coatings any desired thickness. The process based on the formation of a tenacio metal deposit which can be used as priming coat for the subsequent platii metal.

The stage of the process consists breaking down the surface of the mouldi in order that the deposition of the metal particles may be facilitated. In order do this the surface to be coated are expo ed to the action of reducing agents su as pyrogallol, hydroquinone, ferrous su phate, or stannous chloride. The substances, which should be used in liquid form, have a swelling and solve action on the surface of the plastic mat rial.

The following details refer to t copper-plating of urea formaldehyde b the process can be applied to other pla tics, such as phenolics, cellulose acetat cellulose nitrate, or casein.

If the surface of the article to plated is originally smooth, it is first of roughened by immersing in a 10 per ce solution of hydrochloric acid, after whic

It is carefully washed with water. This treatment is followed by immersion in a bath containing a 1 per cent solution of ammoniacal ferrous sulphate, where it is allowed to remain for a period of 15 minutes. Upon removal from this second bath the article is again washed.

It is then transferred for a short period to a 2 per cent solution of copper sulphates, which is maintained at a temperature of 30°C. After washing, the material is subjected to a reducing treatment in the following solution:—

Stannous chloride	25	parts,
Hydroquinone	9	,,
Hydrochloric acid	6	,,
Ethyl alcohol	190	,,
Distilled water	770	,,

The plastic material is immersed in the solution for 1 hour at room temperature, after which it must again be washed, and soaked in an ammonical silver nitrate solution (.5 gr. per litre) for a few minutes.

After washing the article with distilled water, it is washed with a diluted solution of lauryl sulphate (2 grs. per litre). The result of these successive baths and washings is the deposition of a fine metallic haze on the surfaces of the moulding. This metallic deposit acts as the base for the final coating, which can be deposited from the following:—

Copper sulphate	32	parts.
Caustic soda	13	,,
Rochelle salt	42	,,
Formalin	32½	,,
Sodium lauryl sulphate	½	part.
Distilled water	880	parts.

The plating should be carried out at a temperature of approximately 25°C and the thickness of the deposit can be controlled by the time of immersion in the plating bath.

SILVER-PLATING

A method of forming the key coating for subsequent metal-plating of cellulose acetate articles consists of depositing a silver coating over the surface of the part to be metal-plated. After this coating has been formed, normal electroplating may be carried out.

In carrying out the operation the cellulose acetate article may be cleaned with petrol or benzene. This cleaning is of particular importance when the surfaces have been previously polished with a polishing paste.

The next stage in the process consists of dipping the article into a reducing bath for 2 or 3 minutes, withdrawing it, and carefully wiping with a clean dry cloth or with a pad of blotting-paper. Special care should be taken to prevent any of the reducing solution drying on the surface of the acetate since if this occurs black marks will be formed in the silver coating.

The reducing solution consists of 2.5 per cent of pyrogallic acid in distilled water, and the reducing bath should be maintained at a temperature of about 20°C. After the article has been removed from the reducing bath and has been wiped, it is allowed to dry for 1 hour in air at room temperature, or by heating for 8 to 10 minutes in an oven maintained at a temperature of 60° to 65°C.

Two solutions are used in the final treatment of the surface-solution A, which is the silver bath, and Solution B, which is a reducing glucose solution. The preparation of these two solutions are given later so that the full description of the process will not be hampered.

After drying, the material is dipped for 10 minutes in Solution A. kept at a temperature of 22° to 25°C. A brownish coloration of the surface occurs and a metallic shine is noticeable.

A quantity of Solution B, 2 per cent of the volume of silver bath A, is then poured in quickly, the whole being stirred vigorously throughout. After a period of between 4 to 5 minutes a silver coating is obtained. If the presence of the article interferes with the stirring during the mixing of the two solutions, it should be removed for a few minutes while the stirring is being carried out, and dipped into the bath again as soon as the mixing has been completed.

PREPARATION OF SOLUTION A

This solution for silver bath is prepared as follows:—

1. 5 grs. of crystallised silver nitrate are dissolved in 100 c.c. of distilled water.
2. A 3 per cent solution of chemically Pure Caustic Soda in distilled water is next prepared.

100 c.c. of solution (1) are poured into a suitable vessel, and 225 c.c. of solution (2) are added, the whole being stirred during the mixing of the two solutions. The result is a brownish precipitate. After this 400 c.c. of distilled water are poured into the mixture, and then ammonia (22 per cent solution) is added drop by drop until the precipitate has re-dissolved.

Lastly, a few drops of solution (1) diluted with its own volume of distilled water is stirred into the mixture until the whole shows a slight turbidity.

The silver-bath solution thus prepared should be kept in well-corked, yellow glass bottles, and kept in a dark place.

PREPARATION OF SOLUTION B

The reducing glucose solution may be prepared as follows:—

1. Take 50 grs. of concentrated sulphuric acid and slowly add to 625 c.c. of distilled water.
2. Next dissolve 100 grs. of sugar in 1000 c.c. of distilled water.

To 1000 c.c. of solution mix 18 c.c. of sulphuric acid solution and boil the mixture for 15 minutes in a glass flask with a long neck. The resultant liquid in the flask is the glucose-reducing solution and should be kept in well-corked bottles.

SIMPLIFIED PROCESS

A simplified silver-coating process is possible and it is described below:—

The acetate article is washed and cleaned in the manner described above. This is then dipped in a 1 per cent pyrogallol solution for 2 to 3 minutes. After removing from the pyrogallol bath, which should be at a temperature of 20° to 22°C the article is rinsed vigorously in distilled water for about half a minute.

After rinsing, the article is put directly into the silvering bath, which comprises an adequate volume of Solution A to which has been intimately mixed 2 per cent of its volume of Solution B. These solutions are exactly the same as those described for the previous process. The article is then left for 5 to 10 minutes in the silvering bath, which is warmed to a temperature of 20° to 25°C.

METAL SPRAYING

This is a more rapid method of producing a metal facing for plastic components. The operation may be carried out by means of a suitable apparatus after roughening the surface by sand-blasting. The speed at which surface can be covered by this method is a great advantage from the point of view of radio screening.

There are three methods by which metal spraying can be done, namely:—

1. One method using molten metal, where the metal to be sprayed is first melted in a suitable furnace and then poured into the spraying tool.
2. Another method where powdered metal is drawn through the spraying tool, melted in a gas-flame, and sprayed.

3. The third method where the metal to be sprayed is in the form of wire which is drawn through the gas flame, melted, atomised, by compressed air and finally sprayed on to the surface to be covered.

The first of these methods will not be of interest in connection with the metal coating of plastics, so we refrain from dealing with this method in detail; but the powder and wire processes being suitable have been described.

POWDER PROCESS

In this process the most suitable spraying pistol has been invented by Schori Metallising Process Ltd. The pistol is extremely simple in construction and has no moving parts. It can spray metals almost as quickly as the spraying of paint. It is also free from the danger of back firing and is very economical in operation. In the handle of the pistol an air valve is attached and at its lower end are located an air inlet, a gas connection, a powder inlet and an oxygen inlet. Also located in the handle are the following items, namely gas mixer, gas tube, diffusing ring nut, tightening ring, packing ring, leather packing, packing box and needle valve. The barrel of the pistol is built up of a distributor, an injection cone, an injection nozzle, gas and air nozzles, a pressure ring, and various washers and nuts used in the assembly of the barrel group. In addition to the pistol there is a container in which is situated a valve, which is used to control the flow of metal powder from the container to the pistol. The regulation of this valve gives the amount of metal to be sprayed. Also attached to the container is a small air-driven turbine, the object of which is to produce a vibration in the container to facilitate the flow of the powder to the pistol. The compress air supply is directly connected to a distributor from which the three leads run off, one to the turbine, one to the pistol, and the other to the operator's helmet when this is necessary.

At the back of the pistol there is a small hole bored into the suction line and it is only to close this hole with the thumb to provide a flow of powder by suction from the container. The temperature of the flame can be regulated by two needle valves to suit any particular metal.

Generally the pistol has to be fed with clean dry air at a pressure of 40 to 45 lbs. per square inch. The oxygen supply is obtained from cylinders and fed into the pistol at a pressure of 70 lbs. per square inch. Acetylene is also required to operate the pistol. It is supplied from cylinders or from special carbide generators.

The standard Schori pistol can coat as much as 250 sq. per hour using zinc and is found to be as cheap as spray painting.

WIRE PROCESS

In this process the metal, which is to be sprayed is in the form of wire. Any metal which can be drawn into wire and can be melted in an oxyhydrogen flame can be sprayed by this method. The wire is passed through the nozzle of the pistol at a steady speed. Around this nozzle are a number of equally spaced gas ducts through which a mixture of oxygen and a suitable combustible gas, such as acetylene coal gas or hydrogen is fed to the pistol nozzle at a pressure of 15 to 35 lbs. per square inch. The amount of gas varies with the metal being sprayed. Clean, dry compressed air at a pressure of approximately 50 lbs. per square inch is also necessary for the operation of the pistol. The compressed air is fed to the pistol nozzle through a series of posts which are arranged around the gas nozzles.

As the wire passes into the hot zone of the flame, it will melt. The compressed air nozzles are also arranged that the air cuts the flame immediately in front of the melting wire. The air pressure causes the

globules of molten metal to be atomised into fine particles. The action of the compressed air projects the atomised metal particles at high velocity on to any surface within a few inches of the nozzle of the pistol. A brief description of the operation of the process is as follows: The wire is fed into the back of the pistol and passes between two serrated rollers and then passes through the nozzle of the pistol to the flame zone in front of the gas nozzles. The serrated rollers are driven through the reduction gears by an air turbine. The turbine on the other hand is driven by compressed air. The air and gases are all fed to the pistol by means of flexible rubber tubes, and are controlled by a combination of valves which are operated by one control knob on the pistol. Owing to the large flow of gases produced by the nozzle of the spraying pistol, the particles of molten metal are cooled very rapidly and the residual heat is so small that a few inches from the nozzle it is possible to pass the hand through the issuing metal spray without discomfort.

—Manufacture of Book-Binders' Leather Cloth

IN recent years vast amounts of leather cloth for book-binding purposes are manufactured annually by treating cotton fabrics with cellulose lacquers or "dopes." These are known in the market as "Rexine," "Pegamoid," etc. The "dopes" are usually made and used on the spot, and a large variety is employed. They consist of scrap celluloid, solvents, large amount of castor and other oils and camphor or other plasticisers, the bottom coatings containing excess of oil and the top coatings the minimum amount.

The making of leather, cloths or imitation leather by coating fabrics with colloid materials to give a "face," was amongst the earliest technical uses of nitrocellulose or celluloid though the very early attempts were all made with other materials. American cloth is made with special oil varnishes, but the best leather cloths are still made with nitrocellulose as a base.

The first nitrocellulose coating was that of Alex. Parkes in 1855, who water-proofed fabrics with nitrocellulose and camphor, which we called "Parkesine." This was soon followed by L. Comides, who used a solution in wood spirit, alcohol and ether, mixed with gums, colours, and drying oils. After this many leather cloth in different ways until a successful method had been devised by Annison. This method is briefly stated thus:—

The art of applying surfaces of nitrocellulose to a flexible permeable base consists, first, in impregnating the base with a compound sufficiently fluid to permeate it to the required depth to secure a firm hold thereon, surrounding the fibres, and to an extent filling the interstices thereof; second, drying the impregnating compound; third superimposing on the dried compound a coating of a solution of the compound thicker than the solution for the first coating, but sufficiently fluid to be spread over the surface of the impregnating compound, filling the base and partially dissolving the impregnating compound, so as to coalesce and intimately unite therewith; fourth, drying the superposed coating; and fifth, applying one or more coatings of such heavier solution, drying each in turn, until a surface of the requisite body has been built up, whereby the coat is homogeneous as a whole and firmly attached to the initial application; then after compacting the coat by heat, finally embossing it.

It is next found that the elasticity of leather cloth comes from the primer coatings and hardness from the outer coatings. Therefore to get the best results the first coatings should be adhesive, the inner coatings soft, with excess of oil, and the final coatings hard, with excess of nitrocellulose. It is on this basis that modern leather cloths are manufactured.

In all the early recipes celluloid, i.e. nitrocellulose and camphor, was mainly employed, and hence a good deal of plasticiser was always present. For later recipes where collodion cotton is used, plasticisers should be added, and generally tricresyl phosphate is preferred, although the phthalates are better for the final coating. Recently with the enormous range of plasticisers available, sufficient pliability and toughness of the leather cloth to meet all needs is possible.

MODERN METHOD

The following is the detailed description of the modern method of leather-cloth manufacture.

RAW MATERIALS

The following substances are required for making leather cloths:—

1. Nitro Celullose: This is available in the market of different viscosities, of which 40-second viscosity is used always for middle coats and for other coats 20 seconds is better. With the advent of thinner nitro-cottons it is recommended that low-viscosity cottons are better for the first coating, and the solids increased, and 20 seconds or higher for the final coat.

2. Softening Oil: Castor oil is generally considered the best softening oil; but other oils such as olive oil, colza oil, linseed oil, cotton-seed oil, etc., may also be used for this purpose.

3. Plasticisers: The general plasticiser is tricresyl phosphate, though others are used for special purposes, such as benzyl benzoate for toughness; the recinoleates and certain 'Abracols' are also used to prevent stickiness in embossing as well as the alkyl stearates and oleates, whilst mixtures of the alkyl tartrates and oleates, such as butyl oleate and tartrate, are generally considered better for patent finishes. Castor oil and tricresyl phosphate combination seems to work very excellently for leather cloths, and it is claimed that no "spewing out" occurs. The adipates and also the cyclohexanol oxalates are also used for whites, but tricresyl phosphate seems the most economical.

4. Resin Gums, etc.: These are sometimes used to increase adhesiveness of skin coatings. These are: mastic, elemi, dammar, benzoin, Canada balsam, etc.

5. Solvents: In most cases low-boilers have to be used to aid quick-drying, but to aid flow on the knife-edge and to prevent absorption of moisture and consequent "balling of the dope" on the knife some butanol and butyl acetate should be used. For patent finishes a large proportion of butyl and amyl acetates is used; an average may 2 parts acetone, 1 part ethyl acetate, ½ part amyl acetate, ½ part butanol, with 1 to 3 parts toluol. Methylated spirit is avoided because of tendency to absorb moisture and also thin down the "dopes." Direct quick-penetrating solvents usually give a better adhesion and penetration.

CHOICE OF CLOTH

The cloth to be used to make leather cloth should be a fluffy one, of regular wear and of the twill type, so that the "dope" can readily adhere to it, and it is important that the cloth be of constant quality and free from adulterants, loading or size. It is usual to dye it to the approximate finished shade by working it at the boil in solutions of acid dyes in water, soap and Glauber's salt on a "jigger" or other machine. The "jigger" has an endless reversible motion and also a squeezing one to press the dye into the fabric. As it is wound upon one or other of the rollers the cloth is also kept spread out and taut to aid dye penetration.

After rinsing, the fabric is squeezed between heated rollers and centrifuged, and dried by passing over steam-heated rollers to absolute dryness. It is then ready for cleaning, brushing or "fluffing" by passing through a special machine, where it passes first over tension and spreading bars to a cleaning section where dust and dirt and lint are removed by air suction, then passing over the "brushes", which may be of stiff bristles or may be emery or sandpaper for embossing cloths, and finally over steam-heated rollers to remove the last traces of moisture, when it is ready for coating.

COATING THE CLOTH

The coating operation consists in the application of a series of film coating of

nitrocellulose "dopes" to the flexible cloth base, such that they adhere and fuse into a whole and give the cloth a supple and yet tough leathery face which is durable, impermeable and waterproof.

In actual practice it is usual to apply the first or "skin coating" of sufficient fluidity to sink into the cloth base to secure a firm hold or key and at the same time to surround and fill up the interstices in the cloth. This first or "skin" coat is applied with the coating knife with the cloth under heavy tension and resting on a rubber roller. This raises the "nap" of the cloth and assists in the deep penetration of the nitrocellulose "dope" (for this reason the lower viscosity nitrocellulose is best for "skin coating" formulas, so that economy in volume of solvent required may be effected). The second coat is heavier in viscosity and applied thicker, being designed primarily to deposit as much solid matter on the textile as possible (the speed of coating depends upon the viscosity of the "dope", the dryness of the cloth and the temperature of the hot-room through which the coated cloth passes). The third and subsequent coats are very light and intended to produce a firm, hard finish, and one as free as possible from "pin-holes" (usually the operator at the coating machine has coating material of high and low solvent power at his disposal, to meet a contingency of this nature). Each coat partially softens and dissolves the previous one, so that the two coalesce and unite to an intimate whole. That a succeeding "dope" may not cut too quickly or too slowly into the previous coat is adjusted by the relative amounts of cellulose solvent in the several compositions, and by adding the larger portion of the vegetable oil—the flexible portion of the formula—in the middle coating, a firm anchorage and tough outer surface may be produced with the minimum of the most expensive constituent—celluloid. If the last applied coat is too high in solvent power and cuts too readily into the previous layer, this may so weaken the anchorage that a "blister" or insufficiently attached area may result, which will adhere to the embosser in a subsequent operation, and form a blemish. Also, the proportion of vegetable oil present (if there is sufficient oil present, it will retard re-solution of previous coats) and celluloid being directly antagonistic, in order to produce the maximum durability in finish it is necessary for the inner coats to contain a larger amount of oil than the exterior, whereby elasticity is obtained, while the outer coat is high in cellulose nitrate, whereby great strength is attained. The manipulation of oil and celluloid is also adjusted to meet the several trade requirements for the finished material.

COATING COMPOSITION

The usual coating composition as recommended by Arthur Jones in his book "Cellulose Lacquers," for the primer or first coat may be stated as:—

Cellulose nitrate	40	lbs.
Vegetable oil (say castor) (1)	55	,,
Wood alcohol, 98 per cent	12	galls.
Amyl acetate	8	,,
Refined fusel oil	2	,,
Benzine, 62°Be (2)	7	,,
Benzine 71°Be	13	,,

Pigment sufficient to produce required shade.

(1) Usually the inferior grade "seconds" is used for this purpose. (2) The advantage of benzine of two boiling points and hence speeds of evaporation is in using as small an amount of the 71°Be. liquid as possible, on account of its higher price, but which is necessary, or the pre-

ponderance of non-solvent would increase, due to the greater volatility of wood alcohol as compared with the 62°Be. benzine, incipient gelatinisation possibly occurring and thus weakening the film.

For the inferior, the nitrocellulose is decreased from 10-20 per cent. and the oil increased accordingly.

The final or finish coat is again high in nitrocellulose, which may exceed the quantity of oil present by as much as 20 per cent. The volume of combined solvent may vary within wide limits, due to the viscosity of the nitrocellulose used and the volume of colouring matter required.

The fluidity of the coating "dopes" must be about the same in order to flow out under the knife properly in the operations of coating. It obviously follows that cellulose of high viscosity requires more solvent to produce a given viscosity (tenacity). The number of coats to be applied is not a fixed number, but depends primarily upon the nature of and the total solids present in the composition and the required appearance of the coated goods. The boxes containing the coating material are kept on scales near the coating machine, the amount of material consumed continually being noted. In general from 10 to 16 oz. of solid material per square yard finished leather are the usual limits of total solids deposited.

TYPICAL RECIPES OF LEATHER CLOTH

It is impossible to give examples of all recipes but the following are typical illustrations:—

Scrap Celluloid	8	per cent.
Sextone B (Methyl cyclo-hexanone) Acetone	8	„
Ethyl Acetate	8	„
Methylated Spirit	4	„
Toluol	32	„
Diacetone Alcohol	4	„
Butyl Acetate	2	„
Ethyl Glycol	4	„
Tricresyl Phosphate	6	per cent.
Lampblack (in Castor Oil)	16	„

LINEN CLOTH

GENERAL FINISH.

Stock celluloid	175	parts.
Lampblack in castor oil	48	„
Benzyl benzoate	24	„

FIRST COAT:—

Amyl Acetate	1	coat

SECOND COAT:—

50 per cent. general finish	1	coat
50 per cent. amyl acetate	1	„

THIRD COAT:—

75 per cent. general finish	1	coat
25 per cent. amyl acetate	1	„

FOURTH COAT:—

90 per cent. general finish	1	coat
10 per cent. amyl acetate	1	„

FIFTH COAT:—

General finish	20	coats.

SIXTH COAT:—

Sealer hardening varnish	1	coat

SEVENTH COAT:—

Patent leather finish	2	coats.

Patent Leather Finish as required above may be prepared thus:—

Stock celluloid	180	parts.
Butyl acetate	60	„
Benzol	50	„
Butanol	30	„
Amyl acetate	60	„
Dibutyl tartrate	5	„
Benzyl benzoate	15	„
Rape oil	10	„
Camphor	9	„
Dewaxed dammar	17	„

Tinted with spirit-soluble dye dissolved in 10 parts methylated spirit.

Hardening Coat (Sealer) may be prepared as follows:

Scrap celluloid	36	parts.
Ethyl acetate	20	"
Acetone	100	"
Blown castor oil	6	"
"Albertol 82 G"	7	"
Methylated spirit	60	"
Benzol	60	"
Butyl acetate	40	"
Tricresyl phosphate	4	"

Stock Celluloid is 2 lb. cut of film scrap in mixed solvents of wood spirit and acetone.

ANTIQUE LEATHER

This is done by coating the cloth in the basic colour, brown or red cellulose "dope", then usually engraving under pressure and rubbing over the fabric carefully with a pad soaked in a mixture of solvents into which darker pigments, burnt umber and lampblack, etc. have been ground. These collect in the channels of the grain and so produce the imitation of antique leathers. The solvents should be mixtures such that they do not cut into the cellulose finish too quickly; the following mixture is useful:—

Toluol	20	parts.
Amyl acetate	2	"
Ethyl acetate	4	"
Methylated spirit	7	"

Recently leather dust has been amalgamated with cellulose and other media like latex rubber, etc., and the plastic mass turned into sheets of leather-like material.

—INDIAN SALT INDUSTRY

THE Report of the Salt Experts' Committee constituted by the Government of India in April 1948 to advise the Government on the measures necessary to put the salt industry on a sound footing has been recently published. In an exhaustive survey, covering all aspects of the industry, the Committee have suggested measures to increase the production, improve the quality and reduce the cost of salt manufactured and make the country self-sufficient within a reasonably short time.

The production of salt in India has increased from 12,12,000 tons in 1930 to 23,31,000 tons in 1948. The production figures for the two years at different centres and the target figures for 1955-56 are given in Table I.

TABLE I.

	1930-31 (tons)	1948 (tons)	Target For 1955-56 (tons)
Inland Works			
(i) Sambhar	2,73,000	3,16,000	
(ii) Didwana	20,000	47,000	
(iii) Pachbadra	45,000	70,000	9,46,000
(iv) Kharaghoda	1,00,000	1,36,000	
(v) Dhrangadhra	—	58,000	
Marine Works			
(i) West Bengal	—	1,000	30,000
(ii) Bombay	3,82,000	4,50,000	4,65,000
(iii) Kathiawad	25,000	2,93,000	5,15,000
(iv) Kutch	—	65,000	
(v) Madras	3,63,000	8,10,000	9,20,000
(vi) Orissa	—	20,000	60,000
(vii) Travancore	—	61,000	75,000
Rock Salt Mines			
Mandi	4,000	4,000	65,000
TOTAL	12,12,000	23,31,000	30,75,000

The present production (23,31,000 tons) falls short of the estimated consumption by 2,98,000 tons and this is being met by imports. The country's requirements in the next 5 years is expected to go up to 3 million tons.

The bulk of the salt produced in India is from sea brine and salt is raised by solar evaporation in numerous places distributed along the sea-board stretching from Bombay to Calcutta. Rock salt deposits occur in Mandi State and inland salt lakes are found at Sambhar, Didwana and Pachbadra in Rajasthan. The methods of salt production have remained more or less unchanged for decades and the quality of salt-producing areas is sub-standard. The production sites have not been selected with proper regard to economic advantages and factors such as initial density and continuity of supply of brine, rainfall distribution, temperature, relative humidity, wind velocity, surface of exposure, impermeability of soil and protection of sites against floods and dust storms. The Committee have examined these factors in detail and have made valuable recommendations appropriate to each area for improving the production and quality of salt. The measures recommended include (1) maintenance of a high ratio between crystallizers and condensers: (2) removal

of bitterns regularly and draining off the crust before lifting; (3) leaving behind a layer of salt on the crystallizing beds to form a clean floor; (4) setting up of control laboratories; and (5) the consolidating of small uneconomic holdings into units with a minimum area of 100 acres each.

Several improvements have been suggested to enable the existing works at Sambhar Lake area to work more satisfactorily. As a first measure the Committee have recommended a detailed survey of the lake bed. A modified design of a percolation canal has been prepared to replace the present system of canals, and to reduce the present crystallizing area at the works and convert it into condenser area. The present practice of throwing away of bitterns from crystallizers is harmful and is likely to affect quality of brine and of the salt produced, and should be discontinued. It is preferable to harvest two grades of salt, one between 26°-29°Be. and another between 29°-32°Be. instead of a single crop. Largescale production of salt in pans under the direct control of Government and the use of improved methods of lifting brine from the wells and the installation of mechanical washing plants and the establishment of a research station to study the problem of byproduct recovery and the production of salt of standard quality are other measures recommended.

The methods now followed for producing salt at Didwana are unsatisfactory and the salt produced is unfit for human consumption. Advantage is not taken of the wide seasonal fluctuation in temperatures prevailing here to bring about a separation of sodium sulphate and salt. A careful and planned investigation of salt production in this area, and also in other inland areas now operating under private management, is recommended. The latter include Kuda works in Dhrangadhra [illegible] areas in Rajasthan, Kutch and E. Punj[illegible]

RECOVERY OF BYPRODUCTS

The recovery of byproducts from [illegible] inland and marine resources has [illegible] received adequate attention. With the [illegible]ception of the salt worked out at Mithap[illegible] Kharaghoda, Dhrangadhra and Trava[illegible]core, no attempt has been made to recov[illegible] the valuable byproducts such as magn[illegible]sium chloride and sulphate, bromine, iodi[illegible] and sodium and calcium sulphates.

As a potential source of sodium su[illegible]phate, the Didwana Lake remains large[illegible] unexplored. The lake bears a resemblan[illegible] to the Dale Lake (California) whe[illegible] temperature fluctuations are taken advan[illegible]tage of to separate the salts. This metho[illegible] can be adopted with advantage in th[illegible] area and as much brine as possible lifte[illegible] during the cold season and subjected [illegible] pre-cooling to separate out sodiu[illegible] sulphate.

Sodium sulphate as an industrial ra[illegible] material is of special interest to India. It[illegible] utilization for the production of vital che[illegible]micals, caustic soda and sulphuric aci[illegible] deserve consideration. The Committe[illegible] recommends the exploitation of thes[illegible] sources under Government control.

Gypsum is now being recovered a[illegible] Adirapatnam by Messrs Mettur Chemicals, at Jamnagar, Kandla and, more recently, at Mithapur. The Committee are, however, of the opinion that the processes employed for the recovery of by products at many of the centres are not efficient and improvements are essential to obtain a satisfactory recovery.

DISTRIBUTION OF SALT

The distribution of salt in the country, at present, is effected through a zonal system under which the principal regions of production and consumption are grouped under 9 foci of distribution; such as

1. Bombay; 2 Sambhar (R. S. S. Division); 3. Kharaghoda; 4. Tuticorin; 5. Adirapatnam; Madras and Cuddalore; 6. Penuguduru; 7. Naupada; 8. Calcutta; 9. Dhrangadhra. The Committee consider that the present railway freight for salt is excessive and should be revised and be put on the same footing as foodgrains to reduce wholesale and retail prices.

MODEL FACTORIES & RESEARCH UNITS

In order to organize the Indian salt industry on modern lines and make it operate economically and efficiently, the Committee consider it essential for the Government to set up model factories as demonstration units in the principal salt-producing tracts. These factories should have an area of 100 acres and should produce common salt required for human consumption as well as for industry, mixed salts of potassium and magnesium and other byproducts such as gypsum and sodium sulphate. The estimated capital outlay for each model factory will be about Rs. 2 lakhs and should be borne by the Government. Seven such factories, two in Bombay, three in Madras and one each in Travancore and Orissa, are to be set up. The model factories located at Bombay, Madras and Travancore should have research units attached to these for investigating into methods of improving the quality and yield of salt and of recovering byproducts. A separate research station is to set up at Sambhar Lake to tackle technical problems pertaining to inland salt resources.

TABLE II.

	Common Salt	By products						
		$CaSO_4$	$MgSO_4$	Na_2SO_4	KCl	$MgCl_2$	Na_2CO_3	Bromine
Marine Salt Works	17,00,439	95,593	1,48,076	—	76,849	3,39,804	—	5,755
Kharaghoda and Dhrangadhra	1,93,606	6,757	9,024	—	7,812	87,399	—	1,180
Sambhar	3,16,495	—	—	44,799	668	—	20,043	229
Didwana	47,391	—	—	18,076	—	—	8,588	—
Pachbadra	69,985	2,938	11,018	—	—	2,253	—	—
Total	23,27,916	1,05,288	1,68,118	62,875	85,329	4,29,456	28,631	7,164

According to the Committee the Draft Specification issued by the Indian Standards Institution prescribing a minimum sodium chloride of 96 per cent for edible salt is on the low side and should be raised to at least 97.5 per cent and maximum limits to be prescribed for other impurities.

The methods of drawing samples from bulk consignment and of assaying the samples should be standardized and made available in the form of a code of practice.

SALT ADVISORY COMMITTEE

To implement the steps recommended for the development of the industry, the setting up of a permanent Salt Advisory Committee consisting of representatives of Government, manufacturers, consumers and importers is recommended. The Committee is to advise Government on all questions dealing with production, distribution, import and export and any other matter that may arise from time to time.

The Committee is in favour of small manufacturing concerns and associations in different parts of the country federating into bigger regional units and ultimately forming an All-India Federation of Salt Manufacturers.

The levy of a salt cess at the uniform rate of one anna per md. of salt on the

entire salt produced in the country is suggested. It is recommended that the heavy chemical industries should be allowed a rebate equal to the cess collected on the salt consumed.

In order to carry out the programme outlined, it is considered that the present organization, and set-up of the Salt Department should be reorganized and adequately staffed to provide technical assistance both to Government and to industry.

The Committee is not in favour of opening new salt works in the Madras area until the factories improve the quality of salt produced and make it acceptable to the Calcutta market and till a demand for export develops. The existing work would increase their production by more than 12 lakhs tons by improving of manufacture and by properly realigning their factories. The setting up of a large factory at Contai under the management of the Central and West Bengal Governments is recommended with a view to encourage the developmet of salt industry in West Bengal.

The potential capacity of the existing salt works in the country is estimated at 40,26,000 tons per annum. The Committee conclude that, subject to the implementation of its recommendations, it is within the reach of the industry to meet not only the present requirements but also attain the target figure by 1955-56.

THE JOURNAL OF SCIENTIFIC & INDUSTRIAL RESEARCH

—Automobile Rubbing Compound [illegible]

Wax Polishe[illegible]

THE application of cellulose enamels over motor cars are daily increasing because they are very durable and can withstand alternate heating and cooling, as well as hard beating rain, exposure to sea air and washing abrasion. These enamels are generally employed by the method of spraying but the drawback of this process is that the enamels although dried up quickly are not uniformly spread over whole surface. For this reason some sort of rubbing compounds are applied over the dried enamels to smooth down or flatten and then finally polished by means of friction polishes or wax polishes.

In this article we propose to deal with a few practical recipes and preparations of rubbing compounds and polishes.

Rubbing compounds or pastes are emulsions of the 'water in oil' type and essentially of water, fat, paraffin, soap and oils, and abrasive or flatting powders or clay earths in fine form. They should be very easy to work and yet not scratch the finish; they should not dry up or run into balls in working, and for this reason a little glycerine should be added, or soft soap containing it used. The powders may consist of brick dust, tripoli, rotten stone or kieselguhr, with a little pumice powder for coarse flatting powders.

Friction polishes are usually of the "oil in water" type of emulsion, consisting of silica, "floss" or clay, methylated spirit and paraffin or oil, with either a trace of soap or gum, and plenty of water, the gum or soap acting as an emulsion stabiliser. Recently synthetic emulsifying agents such as the 'Nekals', 'Emulphors', 'Lecithin E and many others have been evolved which in very minute traces emulsify oils, paraffin and water, and are proving very efficacious. The alkali oleates and linoleates and triethanolamines are also finding extended use as emulsifiers for making these polishes quickly. In view of this fact the polishes on the market are exceedingly numerous.

Two typical recipes of emulsion friction polishes and two for the rubbing or flatting paste are given below:—

RUBBING OR FLATTING PASTE

Tallow	10 parts.
Soft Soap	18 „
Soft Paraffin	10 „
Water	9 „
Tripoli Powder	32.7 „
Hard Paraffin	2 „
Japan Wax	2 „
Ammonia Liquor	1/5 „
Cassia Oil	1/5 part.
Resin	1 „
Turpentine Oil	10 parts.
Brick Dust	5 „

Melt the tallow, soft and hard paraffin, resin, and Japan wax over slow fire. When melted mix the soft soap and turpentine oil with stirring. Remove from the fire and incorporate the tripoli powder and brick dust. Then mix the ammonia and cassia oil. Stir for a few minutes and then put in pots.

(a)	Triethanolamine	8 ounces.
	Water	5 gallons.
(b)	Mineral Oil	12 pints.
	Oleic Acid	20 ounces.
	Tripoli powder or Kieselguhr	1 lb.

Dissolve the triethanolamine in water. In another vessel mix the oil and acid with

constant stirring. Then add (b) to (a) slowly with stirring. Then mix in the tripoli powder or kieselguhr.

The above compounds are applied with a piece of cloth, allowed to dry and then rubbed to a bright surface.

FRICTION POLISHES

I

Gum tragacanth	1/5 part.
Snow floss	12.8 parts.
Methylated spirit	4.2 parts.
Paraffin wax	12.8 „
Formalin	1/10 part.
Glycerine	2.5 parts.
Water	67.0 „
Emulsifying Agent	Trace

Soak the gum tragacanth in a small amount of water until swelled up. Then add the spirit in it. Now warm the remaining water and mix into it the snow floss, paraffin wax, glycerine and the emulsifying agent. Next slowly add the gum solution and stir vigorously until the whole mass is uniformly emulsified. Lastly add the formalin, as a preservative.

II

Water	67 parts.
Methylated spirit	22 „
Pine oil	5 „
Glycerine	1 part.
Gum Arabic	1 „
Kieselguhr	2 parts.
Emulsifying Agent	Trace.

Dissolve the gum arabic in the water and add to it the other ingredients and lastly the emulsifying agent. Stir vigorously until uniformly mixed and the mass becomes homogeneous.

WAX POLISHES

These creams are used in polishing cars, as it is claimed that they protect against weathering because of the fine film of wax left on the car enamel. They are essentially emulsions of natural waxes in water, soap or alkali and paraffin or turpentine

Recently synthetic waxes have been produced which are easily emulsified with traces of soap in water. These consist of palmityl and stearyl alcohols and are known commercially as "Laurette" and "Lanette Waxes" and more waterproof polishes are claimed. In some cases fatty acids or sulphonated alcohols are combined with the alcohol, which emulsify and form stable emulsions straight away with warm water, viz. "Lanette Wax S. X.," "I. G. Wax N." The chlorinated naphthalenes have also been developed as synthethic waxes, but at present prices of natural waxes are so low that synthetic ones cannot compete. A few typical recipes for these "synthetic" polishes are appended:—

TUBE CREAM

"I. G. Wax N."	35 parts.
Water	125 „
Turpentine	75 „

The wax is melted and the water near boiling slowly mixed in with much stirring until a creamy ointment is produced, when the turpentine is added with more stirring.

"LANETTE" WAX CLEANING POLISH

"Lanette Wax Extra"	4 parts.
Paraffin wax	6 „
Household soap	0.5 „
Water	90 „

POLISHING CREAM

"Lanette Wax S. X."	5 parts.
Petroleum	5 „
Turpentine	5 „
Methylated spirit	5 „
Water	30 „

Regarding the natural waxes, the best ones for polishing are beeswax and carnauba, although ceresin, paraffin, japan and montan are used, chiefly to mix the former to cheapen for specific properties. The natural vegetable waxes are mixtures of alcohol, esters of fatty acids with more

[illegible] less free fatty acids, whilst the mineral waxes are hydrocarbons of high complexity. Carnauba wax gives by far the hardest and most brilliant polish, but is apt to be short and dry quickly from its easy polish solutions and in this respect beeswax is better. Carnauba wax is wholly saponifiable, whilst beeswax is only partially so, hence carnauba wax soaps are often used in polishes. This wax is available in a grey and a yellow form commercially. The esters are largely palmitates and laurates.

Two typical examples of natural wax polishes are as follows:—

CREAM POLISH

Beeswax	6	parts.
Carnauba wax	30	,,
Japan wax	10	,,
Soft soap	15	,,
Water	200	,,
Linseed oil	3	,,
Caustic soda	1/10	,,
Paraffin wax	20	,,
Turpentine	120	,,
Oil of Cassia	1	,,

"STICK" POLISH (SOLID)

Paraffin wax	3	pa
Carnauba wax	20	,,
Caustic soda	2	,,
Turpentine	12	,,
Water	100	,,
Linseed oil	2	,,

WAX PASTE

Carnauba Wax	20	lbs.
Beeswax	13	,,
Montan Wax	7	,,
Stearic Acid T. P.	5½	,,
Turpentine oil	7	gallon
Naphtha or varnoline	7½	,,
Triethanolamine	2¾	lbs.
Boiling water	8	gallon

Melt the first four ingredients in a steam jacketed kettle heated to 90°C and then add the triethanolamine with constant stirring. Next slowly add the turpentine oil and naphtha and the boiling water. Stir rapidly till the emulsion is formed. Remove from the source of heat. Continue stirring until cold.

—DRESSING OF HOGSKINS

HOGSKINS possess peculiarly dense structure which is troublesome to process. To achieve this it is necessary to make full use of mechanical means thus goods should be processed in drums in preference to pits and paddles. The accentuation of the natural grain due to regular mechanical action generally improves the appearance of the leather, but at the same time care must be taken to avoid casehardening and spotty and uneven penetration. When testing for thoroughness of tanning process it is advisable to take several cutting from different parts of the skin.

It is essential that the lard present in the hogskin should be removed as thoroughly as possible otherwise goods will never be able to be properly worked. The most reliable method is to work the skins over the beam with a blunt fleshing knife before depilation. First soak the skins in cold water for 10 minutes, and then work out the saponified and emulsified grease. Next put the skins in drums containing 1½ per cent solution of sodium carbonate for 10 minutes and repeat the processing until the maximum amount of grease is removed.

After the preliminary grease removal process has been completed the goods should be put in drums in one per cent solution of sodium sulphide at normal temperature until softened down; afterwards drumming in several changes of cold water should follow. Depilation can follow in the normal way. That is by painting with a lime and sulphide paste soaking in a strong solution of sulphide. The latter process is far better than the lime method. The goods can be drummed in a 2 per cent solution of sodium sulphide until the hair is thoroughly soft, pulpy and easy to remove. After passing through an unhairing machine or working over the beam with an unhairing knife the goods should be washed in clean water, taken out and allowed to drain, then fleshed by machine. This must be carried out very thoroughly so as to ensure the removal of all traces of fat and flesh and so facilitate penetration of lime.

LIMING

Liming is best done with a saturated solution of lime on the paddle and the wheel should be kept revolving for a period of 25 minutes every 5 hours until the goods are thoroughly plumped. They should then be refleshed and scudded. Before carrying out the latter process it is advisable to soak the skin in luke warm water for 10 minutes. Hand scudding on the grain and flesh sides is preferable to machine work.

DELIMING

Deliming is best carried out with ammonium chloride. It is a good plan to delime in the drum, using 1 per cent ammonium chloride and then to add the synthetic bate when the goods are just right, that is, when the cut surface is colourless to phenolphthalein shows pink after having a few minutes. Any good proprietory bate may be used. After bating, which may take as long as 24 hours, very thorough scudding should follow both on the flesh and grain sides so as to remove all hairs and also as much grease as possible; occasional dips in a tub of warm water always assists the removal of grease and stray hairs. Too much attention cannot be paid to these preliminary processes as hogskin leather making is made or marred in the beam house. Some tanners process the leather in an aqueous grease removing solvent either prior to, or just after bating.

and in capable hands this can give quite good results. The grease may however be removed, by pressing half-way through the tanning process or petroleum degreasing after tanning when in the crust condition.

TANNING PROPER

Any of the recognised processes of tanning may be successfully employed and in the case of vegetable tanning it is a good plan to start off with synthetic tanning agent and then to complete the leather making with natural tannin extracts, preferably rich in non-tans. In the book "Modern Practice In Leather Manufacture" by J. A. Wilson, the following useful recipe employing a synthetic tanning agent may be found giving good results.

"Put a pack of 1000 lbs. pickled weight of stock into the tanning drum, start it running, and add a mixture of 50 lbs. of a commercial syntan and 100 lbs. salt (sodium chloride) in 120 gallons of water at 70°F and run for 30 minutes. Dilute 300 lbs. of solid wattle extract with water to make 150 gallons at 170°F. Add 50 gallons of this liquor and run for one hour. Then add 50 gallons more and run for another hour. Then add the remaining 50 gallons and run for two hours longer. Allow the stock to remain in the drum over night, but have the drum run for, 1 minute out of each hour during the night to guard against uneven colouring. Next morning haul out the stock, press it in a hydraulic press, wheel it to open up the skins and then split or shave it as may be required. Have on hand a stock of liquor of bisulphated quebracho extract containing four per cent of tannin. Put the stock back into the drum and cover with this liquor. Run until the skins are completely struck through in all parts, but for not less than 2 hours. Haul out the stock, pile it on trucks, and let it stand over night, then wash in running water in a drum for 1 hour, pile and send to be fat-liquored".

Promising results can be obtained by prior treatment with polymeric sodium metaphosphate, drumming bated goods in a 3.5 per cent solution for 8 hours. Allow goods to drain for 24 hours, then wash them in the drum and tan with vegetable extracts in the usual way.

A mixture of chestnut, valonia and myrobalans make a good sound blend for saddlery and wallet work. As mentioned previously, when the goods are halftanned they can be pressed in a hydraulic press, then each skin shaken out and thrown into the drum for further tanning. It is advisable to allow the goods to remain in a fairly strong sumach liquor for 48 hours, prior to draining, setting, oiling off and drying. Skins should be hung up to dry and not strained. When dry they are sorted (degreased if necessary), wet down for shaving or splitting, scouring on the battle, washed, re-tanned, dyed and fat liquored using a mixture of sulphonated neatsfoot oil and sulphonated cod liver oil, or a good egg yolk mixture or substitute.

Another method, which works quite well, is to alum-tan the hogskins straight from the bate or drench, dry out and degrease in the petroleum degreasing plant. Afterwards, wet down in the drum and retan with a mixture of gambier myrobalans extract and quebracho. Allow the sulphited tanned goods to lie in sumach liquor for 3 days before washing up, draining, setting, oiling off and drying in open sheds.

—PRESERVATION OF MILK

IT is a well-known fact that milk will not keep fresh very long, particularly in a hot country like India. This is due to the rapid multiplication of bacteria under very favourable conditions of temperature, etc. Under modern conditions of city life, considerable delay is inevitable between the production of milk and its delivery. The greater the delay, the greater is the number of bacteria in it, unless the milk is kept at a low temperature; in other words, the milk must be cooled down and maintained at a low temperature if we desire to keep it fresh as long as possible. Another method of preserving milk is by the addition of certain chemical substances, but as this is considered to be objectionable, we refrain from recommending these materials as a means of preserving milk. Pure milk under the best sanitary conditions would be the ideal. But it must be remembered that even with the most exacting care, milk is sometimes apt to become infected with dangerous, bacteria by means of carriers, flies, etc. So the only protection measure to be adopted is to kill the objectionable microbes before actually delivering to the consumers. The following are the most effective methods of preserving milk:—

(1) Refrigeration, (2) Boiling, (3) Pasteurisation, (4) Sterilisation by Heat or Electricity, and (5) Sterilisation by means of Ultra-violet rays.

REFRIGERATION

This is the best method for preserving clean milk for a considerable time; the milk retains its freshness and sweet taste. The milk is cooled immediately after drawing and kept at a low temperature (35° to 50° F) continuously until it is delivered to the consumer, who continues to maintain the low temperature by keeping it in an ice-box. Cooling the milk even to the freezi point does not kill or injure in any w the bacteria present nor does it dimini the harmfulness of the pathogenic micr bes that may be present; but it preven milk samples kept at 0°C to 10°C r marked increase of bacteria took pla within twenty-four hours. There is a dif erence in growth of the various kinds c bacteria at different temperature e.g., th lactic acid bacteria multiply rapidly a 20°C, while at 37°C. B. Coli communi and B lactis aerogenes grow vigorousl A few species of microbes appear to b well adapted to a low temperature (1°C to 10°C).

Milk is not necessarily wholesome o safe from a bacterial point just because i has been kept at a low temperature. I would depend on the initial number and kind of bacteria present. Refrigeration is an efficient method for the preservation of milk, as the low temperature prevents the multiplication of most bacteria, but cannot destroy the injurious bacteria nor can it atone for the filth.

BOILING

Boiling is considered to be another efficient method of preserving and purifying milk. It is the safest and cheapest method for domestic use. It is found that boiling for a moment kills almost all the bacteria, pathogenic as well as non-pathogenic. The boiled milk will stand fresh for several hours without deterioration.

PASTEURISATION

By pasteurisation is meant the heating of milk for a short time to a temperature below that of boiling, to be followed by rapid cooling. Pasteurisation destroys only some of the bacteria in milk, and pasteurised milk is liable to be "spolit" in the same manner as raw milk. Actually

method of pasteurisation is not merely heating below the boiling point, but the subsequent rapid chilling is very essential. The temperature and time of exposer for pasteurisation vary a great deal according to different observers. The temperatures recommended range from 60°to 70°C (140° to 158°F), and the time from three minutes to thirty minutes. According to Danish Law, a temperature of 80°C (176°F) is required.

There are two principal methods of pasteurisation:—

(1) The "flash" method and (2) the "holding" method. In the flash or continuous flow pasteuriser, the milk is heated to a somewhat high temperature (70° to 80°C) for a moment and then suddenly cooled. The results are generally unreliable and it cannot be depended upon to kill all the pathogenic microbes, e.g., the tubercle bacillus. In the holder or retainer type of pasteuriser, the milk is heated at a lower temperature (60° to 65°C) for a prolonged period (20-30 minutes) and then cooled immediately. This method is sometimes called perfect pasteurisation; it gives very satisfactory results and is therefore preferable to the flash method. Various patterns of pasteurisers of the retainer type are now in the market. A third way of pasteurising milk is pasteurisation in the final container in the milk bottle. This is, no doubt the most efficient way as it eliminates the possibilities of re-infection. The milk bottles are corked and sealed, and then immersed in a waterbath. The water-bath is heated until the temperature of the milk within the bottles is 148°F. This temperature is maintained for 30 minutes. The bottles are then cooled by placing them on ice. This method, with some modification, may be adopted for home or domestic pasteurisation. A very practical home-pasteuriser is that devised by Freeman. A modified form of this is the Straus pasteuriser devised by Nathan Straus, who has been an early and prominent advocate of the pasteurisation of milk and whose philanthropy has helped the establishment of infants' milk depots in New York. "Pasteurisers must be efficient in operation, permitting a definite time (Russell). They must be easy to control, and the milk must be heated uniformly throughout, the apparatus must be simple in construction, easily cleaned, economical in use, and arranged to safeguard against re-infection of the milk. Further, an efficient pasteuriser must not heat any part of the milk appreciably higher than the temperature desired. Finally, provision must be made for rapid cooling". A large amount of scientific work in connection with pasteurisation of milk has been carried out in America, notably by Ayers, Johnson, Rosenau and other. Ayers and Johnson made a special study of the bacteria which survive pasteurisation. The average temperature used throughout the United States with the "holder" process is 62.8°C (145°F) and with the "flash" process it is 71.1°C (160°F). According to these observers, a percentage of bacterial reduction is of no value in determining the efficiency of the process of pasteurisation. They mention four distinct group of bacteria that survive pasteurisation, namely, the acid-forming, the alkali-forming, the inert and the peptonizing. The percentage of the acid group is increased by pasteurisation while the other groups are decreased.

The main known facts about pasteurisation of milk may be now stated as follows:—

(1) Pasteurisation, when efficiently carried out, destroys most of the harmful organisms. It thus prevents disease and saves lives.

(2) While pasteurisation destroys most of the bacteria present, there does

not seem to be any positive evidence as to whether it destroys their toxins or otherwise.

(3) Pasteurised milk is just as digestible and nutritious as raw milk (Rosenau).

(4) The best temperature for pasteurisation of milk is 140° to 145°F (60° to 62.8°C), and the time of exposure should be from twenty to thirty minutes. The cooling should follow immediately and the milk kept at 40° to 50°F.

(5) Pasteurisation renders milk comparatively harmless, but it is not an ideal process as it cannot atone for filth. It is useful, however, as a temporary expedient.

(6) One of the main objections to pasteurisation is that it is likely to promote carelessness and encourage dirty customs and habits.

(7) Pasteurised milk is liable to reinfection, hence the false sense of security should be guarded against.

(8) Pasteurisation cannot make good milk out of bad milk. If pasteurisation is to be adopted, then only such milk as would comply to some reasonable chemical and bacteriological standards, should be allowed to be pasteurised.

(9) Pasteurisation in order to be efficient must be carried out under rigid supervision.

(10) The cost of pasteurisation is comparatively moderate, and from an economic standpoint pasteurisation has been found to be practicable only for large concerns which handle very large quantities of milk.

STERILISATION BY HEAT

Sterilisation by Heat is a step further than boiling and consists in heating the milk to a very high temperature, usually at about 120°C (248°F) for fifteen to twenty minutes. This results in the destruction of all microscopic life. Milk thus treated and protected from re-contamination will keep indefinitely. Sterilisation by heat [brings] about profound physical and ch[emical] changes in the milk and for this [reason] this method has not found much [favour] either in England or in America. [The] "sterilised milk" sold in Enrope i[s not] always sterile.

One of the principal effects of ste[rilisa]tion on milk is the precipitation [of] calcium and magnesium salts. [The] calcium salts in milk are considered essential for the curdling of rennet [in the] process of digestion. According to [some] authorities, children fed on sterilise[d milk] are likely to suffer from scurvy and ri[ckets.] Other observers, on the other hand, [main]tain that sterilised milk does not ser[iously] interfere with digestion nor nutrition [and] scurvy is extremely rare or absent a[mong] children fed on such milk. Sterilisati[on of] milk has been recently advocated in [...] It is stated that the cost of sterilis[ation,] including bottling, is much higher [than] that of pasteurisation. Apart fro[m the] cost, it is not likely to be very popul[ar on] account of its peculiar taste. Be[sides,] when it is homogenised it would n[ot be] suitable for preparing butter.

STERILISATION BY ELECTRICITY

The Sterilisation of milk through a[lter]nating electric currents of high tension [was] first recommended by Guarini and S[a]rini. In this method the milk is allo[wed] to flow through a series of metal ve[ssels] which form the electrodes, which an a[lter]nating current of 2½ amperes wit[h a] voltage of 2,000 is applied for fif[teen] seconds. This has been found to resu[lt in] the reduction of the bacteria present to [the] extent of 99.97 per cent. Chemic[ally] there was no change in the compositio[n of] such milk. In Liverpool, many exp[eri]ments have been made by Prof. Bea[...] and Mr. Lewis. A suitable apparatus [has] been constructed by the latter, and [milk] has been sterilised on a large scale.

rapidly alternating current is used. The results obtained may be summarised as follows:—

(1) The total number of bacteria is greatly reduced by about 99.93 per cent.

(2) Bacillus Coli and its allies are destroyed.

(3) Tubercle bacilli are destroyed. This has been verified by inoculating guinea-pigs.

(4) No chemical change in the milk can be detected.

(5) The taste and odour of the milk are quite unaltered, while its keeping power is greatly increased.

As no chemical changes have been found to occur in the milk, it is presumed that its digestive and nutritive properties are equal to those of raw milk. Should this method prove to be successful from the scientific, clinical, as well as economic points of view, then it would be the best and safest method for purifying and preserving milk.

STERILISATION BY MEANS OF ULTRA-VIOLET RAYS

This is the latest method of preserving the milk. In this process the bactericidal action of ultra-violet rays has been utilised for the sterilisation of milk by Seiffert. According to Lobeck, the exposure of water to such rays results in the tion of hydrogen peroxide, and to t be ascribed the bactericidal power c violet rays. There is no change in t fat. Several observers have o favourable results with the ultr rays from mercury and quarts Mohler and Eichhorn commenting results obtained by Ayers and Jc express a doubt regarding the use o violet rays on a commercial scale s replace the process of pasteurisation

On the other hand, the Dairy S Company of London has been advo the use of Walkey's Patent Ultra Ray Steriliser. The apparatus cons a chamber having four sides. The r admitted at the top from a suitable buting vessel, and flows in a thin s over the corrugated surface on eacl in the interior of the chamber. I centre of the space are three me vapour lamps with quartz tubes, arr to give a maximum effect of intense The lamps are worked by direct el current. The electricity required is two units per hour. It is claimed that treated by ultra-violet rays suffers nc in volume nor is there any alteratic its chemical contents, but is rendered sterile.

—Benefits of Group Farming

AGRICULTURAL Departments in India should undertake experiments in group farming with a view to bringing to the small farmer the advantages of mechanised cultivation and effective soil conservation.

Most farms in India are small, seldom as much as a dozen acres; and often they comprise several separate plots surrounded by other people's land. On such small or fragmented holdings, mechanized cultivation normally is impracticable. Soil conservation works, too, are made difficult: for, to be effective, terracing and contour ridging must extend over entire natural features, regardless of private boundaries.

If the little plots on which the Africans grow their crops could be amalgamated into larger estates, improved methods could be introduced more easily; but how is it to be done without upsetting local customs of land tenure?

HOW THE SCHEME OPERATES

In a group farm, a number of cultivators agree to pool and redistribute their land in such a way that their new holdings lie conveniently for improved farming measures. Any number can form a group. First, the whole area in which their holdings lie is laid out as one large model estate with the land allocated to its best use—arable crops, orchard crops, pasturage and so on—with the cultivated strips running along the contours and divided by terraces or grass to check erosion. The farm may then be re-divided at right angles to the contours into separate holdings, each corresponding in area to one partner's former holding, so that each partner in the group now has a farm the same size as that he owned before.

Complete strips are planted to the same crop-food crops such as maize and sorghum in one, root crops such as cassava and sweet potatoes in the next, perhaps cotton or groundnuts in the third. Other strips are left under grass fallow, and may be used for controlled grazing for livestock. Each year one strip reverts to fallow and a fallow strip is opened up, ensuring a proper rotation.

INDIVIDUALS RIGHTS

Although the members of a group must agree to a programme and a set of rules, each usually retains rights over his lands, is responsible for clearing, stumping, and weeding it, and can sell his crops where and how he chooses. The registration of group farmers as producers' co-operatives is encouraged.

—PHARMACEUTICAL RECI

KINDNEY PILLS

These are diuretics and stimulants of the urinary tracts. A good recipe is as follows:—

Powdered squill	½	gr.
Powdered digitalis	¼	,,
Potassium nitrate	2	,,
Extract of bucher	½	,,
Oil of juniper	½	drop.

Make into a pill.

SPIRIT OF CAMPHOR

Dissolve 1 part of camphor in 7 parts of alcohol and 2 parts of water. The liquid should be clear and colourless, and have a strong odour of camphor. It is used for rubbing in for cases of sprains and muscular pains.

TINCTURE OF ARNICA

Arnica flowers	1	part.
Spirit of wine (68 p.c.)	10	parts.

Allow to stand for a week or 10 days, and then filter carefully. The preparation is used medicinally for rubbing into the skin, as well as for cosmetic purposes, for example in hair oils, hair lotions, and soaps.

MOUTH WASH TABLETS

These are exceedingly useful for travellers, and can be manufactured easily.

Sodium bicarbonate	8	oz.
Saccharin	1	dr.
Vanillin	20	gr.
Coumarin	20	,,
Benzoic acid	20	,,
Clove oil	30	mins.
Caraway oil	30	,,
Lemon oil	30	,,
Wintergreen oil	30	,,
Peppermint oil	30	,,
Carbolic acid	30	,,
Oleo-resin of capsicum	30	,,
Carmine	20	gr.

Mix all the ingredients, granulate as usual, and stamp into 5 grains tablets. One to be dissolved in half a wineglassful of water and used as a mouth wash.

EAR DROPS FOR REMOVING WAX

Ether	1	fl.oz.
Chloroform	1	,,
Sweet Almond oil	2	,,

Mix.

ANTI-INFLUENZA INHALANTS

Menthol	60	gr.
Thyme oil	4	fl.dr.
Cajuput oil	1	,,
Methyl salicylate	1	,,

Eucalyptus oil sufficient to produce 1 fl.oz.
Mix.

CHLORODYNE (B.P.)

Chloroform	2½	
Ether	300	
Morphine Hydrochloride	20	g
Dilute Hydrocyanic acid	1½	f
Peppermint oil	10	ı
Liquid extract of liquorice	2½	f
Treacle	2½	
Simple syrup sufficient to produce	20	fl

Dissolve the morphine hydrochlori the oil of peppermint in the alcohol, a the chloroform and ether. Mix the liq tract of liquorice and treacle with 8 f syrup, add this to the previously forme tion, mix them thoroughly, add the hydr acid and sufficient syrup to produce quired volume.

Dose: 5 to 10 minims.

RHEUMATISM LINIMENT

Menthol	½	oz.
Camphor	½	,,
Methyl salicylate	2	fl.o
Oil of turpentine	5	,
Oil of thyme	2	oz.
Mustard oil	1	pin

Mix.

FEMALE PILLS

Powdered aloes	100	gı
Powdered myrrh	100	,
Compound extract of cocoynth	200	,,
Ferrous Sulphate	50	,,
Oil of pennyroyal	25	dr

Mix and make into 100 pills.

TONIC TABLETS

Calcium hypophosphite	50	grains.
Manganese hypophosphite	25	,,
Potassium hypophosphite	25	,,
Iron hypophosphite	25	,,
Quinine hypophosphite	12½	,,
Strychnine	½	grain.
Potato starch, in powder	200	grains.
Sucrose, in powder, to make	350	,,

Mix the hypophosphite of calcium, n ganese and potassium with strychnine, grind well together in a mortar. Dissolve iron hypophosphite in a little water, granul the mixed powders with the solution, and the granules. Powder the dried granules, pass together with the starch, through a si and make up to the required weight w sucrose. Make into 800 sugar-coated tabl...

—Recipes for Small Manufacturers

[N]ON-SEPARABLE LIQUID BRILLIANTINE

Castor oil	2	oz.
Alcohol 95 p.c.	8	"
Oil of neroli	5	mins.
Oil of rose geranium	10	"
Oil of verbena	5	"
Oil of lemon	30	"

Mix.

SOAPLESS SOAP

10 kilograms methyl cellulose are mixed [wi]th 100 kilograms of saponin extract. This is [bro]ught to the boil and then 150 kilograms of [sap]onin extract added cold. The emulsion [for]med on standing is stated to be excellent for [poli]shing fine fabrics and is also recommended [for] toilet use. By the addition of sodium [lau]ryl sulphate, approximately 10 per cent., the [de]tergent properties of the mixture are still [fur]ther improved.

DOG SOAP

Coconut oil	50	parts.
Caustic soda lye 38°Be	22	"
Caustic potash lye 38°Be	4	"
Naphthalene	1½	"
Alcohol	1½	"
Cresylic acid	4	"

Take the coconut oil in a cast iron pan and [sli]ghtly warm it until liquefied. Then slowly [an]d cautiously stir in the caustic soda lye first [an]d then the caustic potash lye whereby the [mi]xture begins to saponify with evolution of [he]at.

In the meantime dissolve the naphthalene [in] the alcohol. This is added to the soap mass [at] once with good stirring. Lastly add the [cr]esylic acid and pour the mass into soap frame [qu]ickly because it will thicken soon. Cover [wi]th gunny and keep aside for 48 hours to set. [Th]en cut into cubes and stamp.

BOILER COMPOUND

Soda ash	87	parts.
Trisodium phosphate	10	"
Starch	1	part.
Tannic acid	2	parts.

Use powdered materials, mixing well and [th]en pass through a fine sieve.

WHITEANT-PROOFING OIL

Paradichlorbenzol	16	parts.
Creosote oil, 35% cresol	25	"
Wood tar oil	15	"
Heavy mineral oil	44	"

Melt the paradichlorbenzol and pour into [th]e heavy mineral oil of low viscosity. Then [ad]d the other two ingredients.

This product may be applied to the infested [se]at of the wood with a paint brush, mop, or [sp]ray gun. It may also be poured into the [gr]ound in a hole drilled close to the nest or [co]lony.

DEODORISING KEROSENE OIL

Kerosene oil	100	parts.
Litharge	1½	"
Potassium hydroxide	9	"
Water	20	"

Mix and agitate with water in various proportions several times. Allowing the water to settle and decanting.

COLOGNE WATER

Bergamot oil	3	fl. oz.
Neroli oil	1	"
Lemon oil	2	"
Lavender oil	½	"
Petitgrain oil	2	"
Rosemary oil	1	"
Bois de rose	½	"
Rectified spirit	12	pints.

Dissolve all the oils except the neroli and rosemary in the spirit. Distil and add the neroli and rosemary.

INK ERASING POWDER

Alum	1	part.
Amber	1	"
Sulphur	1	"
Saltpetre	1	"

Mix well together and keep in a glass bottle. If a little of this powder is placed on an ink spot or fresh writing, rubbing very lightly with a clean linen rag, the spot or the writing will disappear at once.

PAPAW JAM

Choose fruit three-quarter ripe; remove all skin and seeds; chop up the fruit into small pieces. Weigh, add equal weight of sugar, also some green ginger (cut into small slice), 2 oz. of the latter being sufficient for 6 lbs. of fruit. Cover up the fruit and sugar, and let the latter dissolve during the night. Boil up the next morning until done.

PREPARATION OF CAKES

Sugar	3	lbs.
Butter	1½	"
Whites of eggs	1	qt.
Milk	1½	pints.
Soda	1	oz.
Cream of tartar	2	"
Flour	4	lbs.
Vanilla (to flavour)		q.s.

Beat the butter and sugar till well mixed, add gradually the whites of eggs, and milk, soda, cream of tartar and the flour. Bake in large pans with medium heat. In the above soda and cream of tartar may be replaced by baking powder.

—IN THE FIELD OF INVENTION

NEW ALUMINIUM DEGREASER

A new aluminium degreaser and cleaner is now being marketed by Jenolite Ltd. known as Fenolite aluminium degreaser "A.C." It is claimed that this new chemical will in no way attack the aluminium surface, not even polished aluminium. It is in powder form, and must be diluted at a ratio of 1 lb. of "A.C." powder to 1 gal. of water. It can be applied cold by ordinary distemper brush or articles may be dipped into a bath containing the solution, which must, however, first be warmed to a temperature not exceeding 50°C. The product is also said to be non-inflammable, non-caustic and non-injurious to rubber.

—INTERNATIONAL CHEMICAL ENGINEERING.

FIBRE BOARDS FROM SAW MILL WASTE

It is recently announced that two Australian Scientists have invented a process by which bark and sawdust mixtures can be made into boards by simple chemical treatment. The workers report that on treating these waste materials with small quantities of paraformaldehyde at moderate temperatures and pressures, a new type of board may be produced. Equal parts by weight of sawdust and ground bark are heated at 140°C. with 1 per cent. of paraformaldehyde for three minutes at 180 lbs. pressure for square inch. The resultant board, similar in properties to many fibre boards, is considered so promising that the process may be regarded as a possible solution to the problem of utilising the sawmill waste.

—CHEMICAL AGE.

NEW SULPHURIC ACID PLANT

By eliminating seven major items of equipment, a new process developed by the Chemical Construction Corporation, New York, is claimed to reduce greatly the cost of producing sulphuric acid. The new design is said to be much simpler than the conventional contact process and to save as much as 20 per cent. of the present capital cost of erecting a medium-size sulphuric acid plant in the U.S.A.

Traditional components used in conventional contact process sulphuric acid plants which are no longer needed with the new design include the gas filter, the heat exchanger, the sulphur trioxide cooler, the acid coolers, the acid circulating and transfer pumps, and the diluting equipment.

—CHEMICAL AGE.

RECOVERY OF SPENT LUBRICATING OILS

A method for the recovery of used lubricating oil by a process of chemical washing employing a simple washing tank having an arrangement for mechanical agitation and steam heating is as follows:

The tank is half filled with oil to be refined and while stirring, a vegetable oil (coconut or groundnut), amounting to 2 per cent. by volume of the lubricating oil, is slowly added and the mixture heated to about 180°F. by letting in steam. Sufficient caustic soda lye (15°Be) is then added to saponify the vegetable oil and to leave a little in excess. Stirring is continued for 6 hrs. at 180°F. after which as much fresh water as can be conveniently handled is added and stirring continued for a further period of 4 hrs. maintaining the temperature at 180°F. Steam is then turned off and stirring stopped. The sludge is allowed to settle at the bottom and when the whole mass has cooled, it is drained off from the bottom. Sufficient amount of fresh water is again added, steam let in to raise the temperature to 180°F. and the process repeated as before. Usually two washings are sufficient to free the oil from alkali. The washed oil should be examined and filtered and tested for its specific gravity, viscosity and other physical properties before use.

The oil refined by this method has been found to be similar to original oil in its behaviour when used for lubricating purposes.

—JOURNAL OF SCIENTIFIC & INDUSTRIAL RESEARCH.

MOULD CLEANING

A new technique of cleaning moulds in rubber industry is described (Rubber Age & Synthetics, April 1950).

The moulds are immersed in hot fused salts at a specified temperature for about 30 mins., depending on the size of the mould. After withdrawal of the moulds from the salt, they are washed thoroughly in water and then carefully dried. The application of a special brightening solution gives a lustrous finish. The process is equally effective on light alloy type moulds also. In the case of composite moulds, washing and drying has to be more thorough to avoid risk of corrosion due to sweating at the intricacies between the dissimilar metals. Washing in boiling water followed by a rinse in a solution of sodium bichromate (3 to 4 oz. per gal. at 200°F.) is recommended. The equipment required is a gas or electricity heated bath of a cubic capacity twice or thrice that of the largest mould to be treated. The process is time-saving, efficient and easy to operate. The salt used is quite inexpensive, of low viscosity at the operating temperature, highly soluble in water, non-poisonous and does not emit objectionable fumes. The "drag-out" loss of salt is very low and can be reduced to negligible proportions by allowing the moulds to drain after lifting from the bath.

Details of the process are obtainable from the Electric Resistance Furnace Co., Ltd., Weybridge, Surrey.

—JOURNAL OF SCIENTIFIC & INDUSTRIAL RESEARCH.

CAMPHOR TABLETS

1693 Y.V., *Nellore*—Wishes to have a formula of making camphor tablets.

Moisten camphor powder or crystals with a smallest quantity absolute alcohol and then compress into sheets in a suitable mould. Then allow the alcohol to evaporate by keeping the sheets in a tray for a few minutes. Lastly cut the sheets into tablet forms by means of punching machine.

EGG POWDER

1694 S.K.S., Ranchi—Desires to know a process of making egg powder.

In accordance with the use to which the product is to be put, eggs are either dried whole or the yolks and whites are dried separately. The products are styled whole egg powder, dried almumen or dried yolk. Dehydrated whites of eggs are known in the trade as egg albumen and the yolks are dried egg yolk. The whole dried egg is known as egg powder.

A simple method of drying eggs, not having many objectionable features consists in spreading the thoroughly agitated liquid mass in a thin layer on a copper cloth belt. This is discharged from a fan blower. At the best conveyor melt is usually enclosed in a drying chamber through which warm air currents circulate. This process is not very rapid and the product obtained is not very good.

A superior product possessing excellent blowers of solubility is obtainable by employing vacuum drum dryers similar to those employed in dehydrating milk. After being broken up the egg mass is thoroughly agitated and then spread upon the surface of the revolving drum. As the temperature of evaporation must be kept very low in order to prevent the coagulation of the egg proteins, a high vacuum is applied. The temperature employed is about 110°F hot water being used as a heating medium. The film of dehydrated egg, upon being scraped off, is then reduced either to the size of rice grains or to a powder more or less fine.

GALVANIZING IRON ARTICLES

1701 S.S.S., Calcutta—Desires to know a process of galvanizing iron.

Zinc coating which will not crack or peel off during the rivetting or bending operation of the galvanised sheet is produced by what is termed as "Dry galvanising process". An outline of which is given below:

The sheet is picked by cold concentrated hydrochloric acid and washed and stored in hot water in the manner already described. Immediately before galvanisation the sheet passes through a hot bath of saturated zinc chloride solution and dried in furnace. The hot and dry sheet is then introduced in zinc bath containing about 0.2 per cent Al. and withdrawn at a comparatively slow but steady rate in an inclined position. Too quick withdrawal will result in uneven coating of zinc layer over the sheet. The bath is replenished with regular addition of aluminium in quantities 1 per cent. much larger than the actual aluminium content of the bath in order to make up the loss due to its excessive affinity for oxidation. No covering of flux layer can be used over this type of bath as in that case aluminium chloride will form as a result of the chemical action with ammonium chloride and due to the volatile character of aluminium chloride, all aluminium will soon evaporate out of the bath. Low rate of production and high cost of galvanisation are its chief defects.

CEMENT FOR JOINING PLASTIC ARTICLES

1703 K.T.W., Agra—Wants to know the method of joining plastic articles.

It is often desirable to cement two plastic parts together instead of joining them by some mechanical means. With cold-set plastics, a properly cemented joint will have 60 per cent. of the strength of the plastic.

For properly cemented joint, it is necessary that exactly the right amount of cement be applied to the parts to be joined. After this the two-parts should be held together under slight pressure until they are fairly dry.

The cementing of plastic parts must be confined to parts moulded of the same type of material, as dissimilar plastics do not bond together.

For the strongest bond, special phenolic amounts are recommended depending on the type of plastic. With the thermoplastics solvents may be used for cementing. Acetone with or without dissolved cellulose acetate has been used with success for the cementing of cellulose acetate parts. Ethyl acetate may be used with equal success on polystyrene parts. Acryloid B-72 cement has been used satisfactorily on parts moulded from vinyl plastics moulding materials.

LIQUOR AMMONIA

1711 G.K.S., Amirakadal—Wishes to know the process of making liquor ammonia.

There are various methods for obtaining pure ammonia solution of sp. gr. 880 from crude liquor obtained as a byproduct in the manufacture of coal gas. The methods consist essentially in redistilling the latter after addition of excess of lime, and after freeing the vapour as much as possible from water by means of a reflux arrangement, passing it over lime and wood charcoal contained in suitable vessels, and then into pure water.

A simple arrangement for the manufacture of pure liquor-ammonia consists of an ordinary boiler fitted preferably with a reflux arrangement and connected with a series of tanks made of iron or wood with lead, and containing

trays of slaked lime. Beyond these are a series of absorption vessels. They must be provided with a hydraulic inlet valve to prevent regurgitation and with taps for drawing off the strong liquor into carboys. The boiler is charged with crude ammonia liquor mixed with a large excess of milk of lime. The absorbers are charged with pure water.

SEPARATING POTASSIUM NITRATE FROM CHLORIDES, ETC.

1733 N.B.S.R., Ballabgarh—Desires to know a method of separating potassium nitrate from chlorides, etc.

The usual method adopted by the manufacturer is stated thus:—

In an iron pan 1050 lbs. saltpetre is dissolved in 600 lbs. of water at a gentle heat; the solution is brought to boiling heat, and another 1800 lbs. of saltpetre is dissolved in it. When employing these proportions with saltpetre containing about 20 p.c. of chloride, the nitrate is dissolved completely, but the chlorides partially. The latter is finished out with a perforated ladle. If calcium or magnesium salts are present, potassium carbonate is added until a fairly alkaline reaction has been produced. The hot clear liquor is diluted with 300 lbs. of water, a solution of 1 lb. of glue dissolved in 20 litres of hot water is stirred into it, and the whole brought to boiling again. The glue combines with organic substances present forming scum, which rises to the surface and is carefully removed. When no more scum rises to the surface, the liquor is allowed to settle for 25 hours in warm place and the clear portion is run into flat copper coolers. As soon as the crystallisation begins, the liquid is constantly stirred, either by hand or better by machinery. Thus the potassium nitrate separates as minute, floury crystals. These are drained off and cold water is sprinkled over it to remove all adhering mother-liquor. This is usually done in vessels provided with a perforated false bottom, covered with linen. Finally the floury particles are dissolved in a small quantity of hot water and then set aside to cool without disturbing when large crystals of saltpetre begin to appear.

DRAKSHASAVA

1735 R. S., Agra—Wants to know the process of preparing drakshasava.

Drakshasava is prepared from the fermented juice of grapes. For this purpose take 50 parts of fermented juice of grapes, 10 parts flowers of woodfordia floribunda and 40 parts sugar and mix. Keep in a closed earthen vessel in a cool place for a month. Then strain and bottle.

PRECIPITATED CHALK

1753 R.P., Eluru—Wishes to have a method of preparing precipitated chalk, and also extraction of arrowroot, etc.

To prepare precipitated chalk add a strong solution of carbonate of soda to a solution of chloride of calcium (both cold), as long as a precipitate forms. *The precipitate is finally* washed several times *and dried.*

WAX PAPER

Wax paper is largely used for wrapping products that contain a certain amount of moisture, which it is desirable to retain; such as tobacco and snuff; also as a covering for gum pots, to exclude injurious atmospheric influences, etc.

A number of sheets of unsized or slightly sized paper of firm texture are placed in a pile on a large table, and a little scraped wax is laid on the top most sheet. On applying a hot flat iron, the wax will melt and penetrate the paper, the surplus making its way down into the second and third sheets. As soon as the iron gets cool it must be replaced by a fresh one.

For larger quantities it is preferable to work with a roll of paper mounted on a roller. From this roller the paper is led through an enamelled iron trough, containing wax that is kept in a molten condition by a suitable heating device. The trough also contains a glass rod mounted in such a manner that it can be taken out when required; and on the one edge of the trough is mounted a steel scraper set at such an angle that the band of wax impregnated paper can slide over it without being cut. Just above the scraper are two porcelain rollers set close together so as to remove all surplus wax. The impregnated paper can be allowed to fold loosely on itself at a short distance away, and at the end of several hours will be ready for cutting up into sheets.

ARROWROOT

Arrowroot is a kind of starch obtained from the rhizome or tubers of Maranta arundinacea. For this purpose the roots are carried to the washing trough, which is fitted at its centre with a spindle having diagonally inserted pegs of sufficient length. Here the roots are thoroughly cleaned of all foreign matters still adhering to them. They are then dropped from a hopper on to the grater, a large wooden cylinder covered with perforated iron sheets.

A stream of water pours upon this continuously from above, and the pulp and starch, held in suspension, pass on to a shaking sieve. From here the farina and water pass to another sieve leaving the pulp in the former sieve which is utilised as manure. The farina and water now make their passage into a large trough where the starch soon settles at the bottom.

When a sufficient quantity of starch has been collected in the last tank, it is allowed to settle firmly and the whole of water is gradually drawn off through a series of taps.

When the complete removal of water takes place, the surface of the residue will be found to be covered with a dirty slime. This is washed off and collected for pig food. Water is again poured into the tank and after agitating

the farina it is allowed to pass through a fine silk sieve. After further skimming and washing, the product passes into a circular trough, provided with an agitator, which revolves and thoroughly strips up the whole mass. Afterwards the product is allowed to settle and remove from the circular trough and put into centrifugal machine to extract all possible moisture. Finally, it is taken to the drying ground, where it is exposed to the sun on frames covered with calico. When completely dry, the arrowroot which is now brilliantly white, is bagged and put up for the market.

LIQUID CANVAS SHOE DRESSING

1761 H.C.K., Delhi—Wishes to have good recipes of liquid canvas shoe dressing and also blanco.

China clay	16	oz.
Whiting	8	,,
Bentonite	6	,,
Precipitated chalk	4	,,
Powdered gum tragacanth	2	,,
Carbolic acid	2	dr.
Water	q.s.	

Mix the powders and knead with water. Then add mucilage of gum tragacanth prepared with a few ounces of water. Next add the carbolic acid and add more water to make it a thick syrupy fluid.

BLANCO

Whiting or china clay	74	parts.
Glue	1	part.
Water	25	parts.

The water is warmed to about 176°F and the powdered glue is stirred in until dissolved. The whiting is then added slowly with constant stirring after the source of heat has been removed and to each 100 lbs. of mixture 8 oz. of sodium salicylate are added to prevent decay of the glue during subsequent storage. When the paste is smooth and uniform it is placed in warm moulds and after cooling the cakes are removed and packed.

For coloured blanco use pigments such as yellow ochre, chrome oxide, red oxide of iron.

CHEWING GUMS

1807 P., Delhi—Desires to know a good formula of making chewing gum.

Gum chicle	130	parts.
Hard paraffin	37.3	,,
Balsam tolu	6.2	,,
Glucose, liquid	150	,,
Sugar, powdered	370	,,
Balsam peru	3.1	,,
Water	170	,,
Vanilla tincture	Sufficient.	

Soak the chicle in water, and mix hot with the melted paraffin and the balsams.

Next boil the sugar in the water to produce syrup, and knead with chicle mixture to produce a plastic mass.

TRANSFER PAPERS

1816 J.R.K., Ludhiana—Wants to have recipes of making transfer papers.

There are various kinds of transfer papers such as lithographic transfer paper, decalque papers, etc. A couple of recipes are given below.

LITHOGRAPHIC TRANSFER PAPER

Dissolve in water ½ oz. gum tragacanth. Strain and add 1 oz. of glue and 1 oz. of gamboge. Then take French chalk 4 oz.; Old plaster of paris ½ oz.; Starch 1 oz. Powder and sift through a fine sieve; grind up with the gum, glue and gamboge; then add sufficient water to give it the consistency of oil and apply with a brush to thin sized paper.

DECALQUE TRANSFER PAPER

The new transfer paper invented by J. B. Duramy consists of a paper of the kind generally used for making pottery transfers, but coated with a mixture of gum and arrowroot solutions, in the proportion of 2½ parts of the latter to 100 of the former. The coating is applied in the ordinary manner, but the paper is only semi-glazed. Furthermore, to decorate pottery ware by means of this new transfer paper there is no need to immerse the ware in a bath in order to get the paper to draw off, as it will come away when moistened with a damp sponge, after having been in position for less than 5 minutes, whereas the ordinary papers require a much longer time.

BIRD CATCHING GUM

1822 P.T., Johara—Wishes to have good formulas of bird catching gum, rearing turkeys, etc.

Bird catching gum is a type of sticky gum possessing strong adhesive properties and does not dry up like ordinary adhesives. It may be prepared as follows:—

Rosin	32	oz.
Castor oil	8	,,
Raw Linseed oil	10	,,

Melt the rosin over slow fire and mix the castor and linseed oils. Mix thoroughly. Apply over the stick.

REARING TURKEYS

Turkeys are susceptible to liver troubles caused by indigestion, cold and climatic changes. So the poults are first fed bread crumbs moistened with milk, this being changed gradually to the same mash as suggested for chicks, except that chopped onion tops, lettuce, dandelion, chick weed, papita leaves or any other succulent green food, must accompany every meal and a dish of sour milk or milk curd placed where they can help themselves. Feed just what they will pick up quickly, then remove and leave no stale food lying about.

Do not feed chicks and poults together, except possibly just at first to teach them how to feed.

Give the young stock full range as early as possible and keep a gun handy to keep away

crows and hawks. Give warm, dry, open-fronted housing. Feed, as they grow up, on a light mash once a day with onions and green feed in it, and grain scattered at night. Avoid overfat breeding stock and see that the turkey cock is not too weighty for the hens. He does not need to be constantly with the hens unless the flock is a very large one, say ten to twelve or more hens.

TESTING OF EGGS

An expert tester can put an egg in his hand, and holding it up to the sun, say whether it is fertile or not. But for a novice this system of egg testing is very difficult and their purpose may be satisfactorily done with an egg tester, by which it is possible for them to distinguish fertile from infertile eggs. The following is a simple method of testing the fertility of eggs:—

Take a piece of stout cardboard and cut a hole in it the shape of an egg, only a little smaller, place one of the eggs sideways against the hole, and then hold up to the light brought closer than 6 inches to it. If the egg is perfectly transparent like a newlaid egg, it is infertile; but is a small spot with fine veins around resembling a spider in web is seen floating about the centre of the egg, it contains a live embryo. If an egg contains a dark mass that moves to and fro, and the spider-like form is absent and the air-cell line misty, the egg may be removed as containing a dead germ. Any doubtful egg should be tested on the fourteenth day after setting. It is impossible to tell if an egg is fertile or not until the 10th day after setting. An egg that is quite clear after being 21 days under the hen is infertile; if the egg has a partly-formed chicken in it, or is rotten, then it is addled; if the chicken is fully formed in the egg and is dead in the shell, it is spoiled. If germ has formed in the egg and not hatched, it is fertile, but has been addled or spoiled by some cause or other for which the eggs may not be to blame.

ICE CREAM POWDER

Cream. Pure Cream, 2 gal.; sugar 4 lb. flavouring as desired. Mix well and freeze.

Egg. Milk 2 gals.; sugar 4 lb., flour 4 oz.; eggs 12, common salt 1 dr.; flavouring as desired. Mix the flour, sugar and salt, with 1 qt. of the milk, add the eggs, which should be well beaten, and the flavouring. Heat the milk to boiling, mix all together, boil for a few minutes, let cool, strain and freeze.

Fruit Ice Cream. Milk 1 pt.; sugar 2 cupfuls; flour 1 table-spoonful; eggs 2; gelatine 2 table-spoonfuls; soaked in a little water; cream 1 qt.; bananas 4 and other fruits if desired. Let the milk come to a boil, beat the flour, sugar and eggs together and stir in boiling milk. Cool 20 minutes, then add the gelatine. When cold add the cream. But in the freezer, freeze 10 minutes, add fruit, and freeze.

Lemon. Six large lemons; cream 1 pt.; sugar 12 oz. or ½ pt. of syrup. Grate the peels of 3 lemons into a basin; squeeze the juice t Let stand for 2 or 3 hours, strain, add cream, and syrup, and freeze or mix.

CORK SHEET

1837 S.D., Calcutta—Desires to know a thod of making cork sheet from cork dust.

To make cork sheet from cork dust mal dough with a solution of nitrocellulose in tone. This is then moulded, compressed rolled into sheets. Then allow to dry.

STRAW BOARDS

1838 A.N.M., Calcutta—Desires to be lightened with the process of making st boards.

Straw board is made either from gra or grain straws such as rice or wheat; so from bagasse, sugarcane tops, trash, bul-r etc. The aim in the production of the p for board is not to get pure cellulose but to make the material somewhat soft. He caustic soda used is not in full amount req ed for treating the material for ordinary pa The material is boiled with only 5 to 8 per c caustic soda or 15-20 per cent. lime for al 3 to 4 hours in open boilers or digestors 25 to 50 lbs. pressure. This also gives a gre yield of pulp than that for paper mak The pulps are not bleached and may or r not be sized and coloured. The concentra of the pulp in the vat is 3 to 4 per cent. depends upon the thickness of the board quired. The average yield of the boards f these materials is from 40-60 per cent.

In pulp making the material is beaten f ly rapidly. Pulp for straw boards can also made in a country chunam mill as is used making chunam paste for plastering.

In making the sheets, the pulp taken the mould is thicker than for the other varie of paper. Sometimes two or three layers wet sheets are placed one over the other order to get a thick sheet. Instead of ordin cloth hessian or jute cloth is used for couch the wet sheets of the boards. They must pressed hard in order to make them stiff a strong.

Sometimes the pulps are loaded v coloured ochres (generally yellow ochre) to crease weight and give a smooth surface to boards. For waterproof boards the pulp sized with 2 to 3 per cent. of rosin. The v boards are dried in the fields. The boards not allowed to dry hard but in a slightly da state they are piled in a heap so that they r not warp. They are calendered in a he calender. Boards can never be properly ha glazed as they are too thick. If the boards hard dried and bent or warped, they should damped with water and piled in a heap a pressed with stones or in a screw press to ma them flat before calendering.

Materials treated with caustic soda prod stiffer boards than when lime is used for th treatment. The yield of the boards depe upon the amount of the alkalies used in

reatment. The following data for board pulps from sugarcane trash will be useful.

Sugarcane trash	50	lbs.
Caustic soda	2½	„
Fuel for boiling for 3 hours	40	„

Power required for pulp making 4 units K.Ws. in 2 hours.

The pulp obtained is 24 lbs. or 48 per cent. As the quantities are small no labour data can be given. The usual size of the board is 25" × 32" with varying thickness. Each sheet weighs from 8 ozs. to 1½ to 2 lbs. according to the thickness.

GUT MAKING

1859 P.A.S., Madras—Wants to know the method of making guts.

The first stage in gut making consists in freeing the intestines from any adherent fatty matters, after which a number of ends are tied together and the major portion is left to lie in water for about two days, the water being meanwhile frequently changed, the object in view being to soften any mucous membranes so that they may be more readily removed by scraping. The gut is then sorted out and graded for different purposes. That which is intended for strings is put in a solution, consisting of 4 oz. of caustic potash and 4 oz. of carbonate of potash to each 4 gallons of water. They ought now to scrape quite clean from their inner mucous coat, and will consequently be much smaller in dimensions that at first. They may now be wiped dry, slightly twisted and passed through a hole in a piece of brass, to equalise their size. A number of pieces may then be spun together and left as they are if desired semi-transparent, or dyed in various colours. The gut, whilst still in a moist condition, takes dyes readily. As the guts dry, they are passed every two or three hours through other holes, each smaller than the last. When dry they will be round and well polished, and being oiled are fit for use.

REFINING SILVER

1871 N.M.A., Koothanallur — Desires to learn a process of refining silver

In order to refine silver, dissolve the ordinary silver in pure nitric acid, evaporate the solution on a water bath and fuse the residue. Next dissolve the residue in weak ammonia solution. Then dilute the blue solution so obtained with sufficient quantity of water to bring the strength down to 2 per cent. of silver. Now add sufficient quantity of normal ammonium sulphite to render the solution colourless on warming. After standing for 14 hours in a stoppered vessel, 1/3rd. of the metal separates out in the crystalline form. The liquid which is still blue, when cold, is pasted off and heated from 60° to 70°C, when the remainder of the metal is thrown down. Then wash the precipitate and allow it to stand for several days in contact with strong ammonia solution; then wash, dry and fuse it in as unglazed porcelain crucible with 5 per cent. borax and 5 per cent. sodium nitrate, and finally cast in a mould lined with a mixture of burnt and unburnt kaolin. Finally clean the bars with sand and apply heat with potash and wash in water.

PURITY TEST FOR GHEE

1895 M.L.S., Bahraich — Desires to know a process of testing purity of ghee.

There are various methods of testing ghee but not a particular one will give a correct result. But following a number of processes one may be able to determine the purity of ghee correctly. Of course the refractometer method, which is followed by the ghee dealers one may be able to know whether the ghee is pure or adulterated. No exact proportion of the adulteration may be obtained by this method. The method is very simple and even a novice can find out the result. The apparatus is known as Butyro-refractometer or butter refractometer. It gives colour-fringe of oils and fats together with their refractimetric value of a definite temperature, say at 40°C. In this method it has been proved that the refractometric range for pure samples of butter-fats is limited between 40.0°-43.5° at a temperature of 40°C and the colour fringe observed, though invariably colourless, is also at times violet tinged. Whereas for other types of fats and oils namely, cocogem, coconut oil, groundnut oil, sesame oil, and vegetable ghee. Other respective colour-fringes are deep orange, bluish-green, yellowish-green and blue.

HYDROCHLORIC ACID

2027 A.H., Faizabad—Wants to know a method of manufacturing hydrochloric acid.

Hydrochloric acid is easily obtained by the action of sulphuric acid on common salt. The decomposition is effected in a cast iron retort with an evolution of gaseous hydrochloric acid. This is then conveyed by the flue to the condensing tower—a brickwork structure filled with fragments of coke or brick and having a stream of water descending through them. This water meets the upward current of hydrochloric acid gas, dissolves it, and the solution escapes at the bottom. In this way commercial aqueous hydrochloric acid is manufactured.

—READER'S BUSINESS PROBLEM

[Reader's business problems will be discuss ed in these pages. We invite the reader to wr us his difficulties. As the department is in charge of an experienced businessman who specially adept in dealing with such problems and to whom experiences of a large numb of successful businessmen are available, his replies will lead the enquirer to a successf career. These replies will be published in the paper only and cannot be communicated post.]

STARTING A BOOK SHOP

2731 K.G.R., Bombay—I wish to start a book shop on a small scale say with Rs. 2,000 as capital in any town. I shall be highly obliged if you advise me properly so that I may be successful in my business.

In the beginning Rs. 2,000/- will be a reasonable start. It will grow steadily as business improves. In the beginning it should as far as possible be worked single handed till your business demands another helper. The book should be situated on a thoroughfare preferably in the vicinity of schools and colleges.

Book cases and almirahs should be decent and up-to-date. You should read the reviews in dailies, weeklies and monthlies and stock such books in small number as may be systematically increased according to the public demand for them. Always remember the name of book for which enquiry has been made. The price should be fixed to the minimum percentage over the cost, say from 6¼ to 12½ per cent.

When an author has made a name pretty well anything written by him will sell and should be given a front place. Don't stock books just because you think they ought to be sold or because you admire the author yourself. Your customer may not be upto your level and in any way your business is to sell them books but not to educate them. Gauge the taste of your public but don't let them see you doing it. Be topical and notice the signs of the line and be in advance of the season. Watch the books and book novelties of the season and take full advantage of the line and put them in a prominent place where enthusiastics may see and possibly buy.

Don't be afraid of taking a little trouble with your customer. If you have not the particular book asked for in your stock, order them without demur, and get them in promptly. Don't mind answering apparently useless questions. They may lead to business when you least e pect it, and always be ready to advise wh some one comes in with such a remarks as ' want a book for a delicate boy of twelve." I not hesitate but bring out some book suitab at once. Of course it will take ingenuity, b that is only a part of your business. Som young men at book shop are excessively superio and somewhat forbidding. They make the mer purchaser think that he is guilty of an impe tinence in the symmetry of the book case b removing a book from it. Don't imitate thos excessively superior youngmen. Always loo pleasant whatever you may feel.

DIFFERENCE BETWEEN RETAIL AND MAI ORDER BUSINESS

2735 R.L.D., Delhi — Writes, what is th difference between Retail and Mail Orde Business.

The retailer depends upon being topical and novel in his display. His shop must be fresh and contain the latest goods.

The mail order business on the other hand, gains its chief success by constant adherence to one unvarying quality, if possible at one unvarying price, the goods being marked with an easily recognised description so that the buyer in December of this year may be able to rely upon getting the same article he got in March of last year.

In advertising the object of retail publicity is to draw buyers to the shop; in mail order business, to keep their attention on the article.

The retailer need not make a profit on the article he advertises. The mail order trader must do so. One can offer goods that will not be repeated—that may even be cleared out in an hour. The other courts disaster if he cannot keep up a constant supply of his advertised brand.

—BRIEF QUERIES AND REPLIES

Questions of any kind within the scope of Industry are invited. Enquiries or replies from our experts will be published free of charge in serial order. Questions are replied by post on receipt of As. 8 stamps for each question. Subscribers outside India are requested to send two International Reply coupons for each question. In order to facilitate the work of Editor's Department and to help prompt action the readers are requested to send enquiries in separate letters.

2129 S.L.I.C., Calcutta—You may use ordinary cement ad bricks for erecting a tank to stock ink. You should manufacture distilled water yourself otherwise the expense will be too much. You may use a filter press for filtering ink.

2130 P.G.P., Bombay—You may filter the oil through filter paper. You may use white oil as thin mineral oil. You may use water and oil in equal quantity, then stir well. Let settle the oil which should be decanted. Now add 10 p.c. burnt lime. Properties of the oils used are mainly cleaning and lubricating.

2132 C.F.W., Batala—Process of manufacturing grinding wheel will appear in due course.

2133 W.S.B., Ambala—Reply of queries appears in the columns. But when 8 As. stamps are enclosed with the letter reply is sent by post.

2134 A.S., Ahmedgarh—You have to use spinning machine for giving shape to sheet metal such as aluminium. For machine enquire of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta.

2135 J.G.G., Calcutta—Bamboo grows throughout West Bengal, Assam and Bihar. Bamboo camphor is found inside a few of the matured bamboos. Sathi plant grows wild in Assam and in Malda district of West Bengal, Gorachan is not available in W. Bengal, Assam and Bihar.

2142 B.R.T., Ratan Nagar—Wants to be put in touch with the dealers in semi-precious stones in Tibet, Nepal and Kashmir. You may consult Indigenous Drugs of India by R. N. Chopra.

2143 P.V.K.M., Karur—Assafoetida is a natural product obtained from juice of roots of certain plants grown in Afghanisthan and Beluchistan.

2144 O.P., Delhi—Process of manufacturing nigrosine and bleaching shellac will appear in Formula section in due course.

2145 A.I.W., Raniganj—You may consult Chemical Industries of India and Manufacture of Soap, publishd from this office, price Rs. 3/7/- each including postage. We have no book on asbestos sheet and asbestos product manufacture.

2146 B.T.I., Bombay—You may use the following glue for shuttles: Glue 20 parts; Water 20 parts; Acetic acid (30 p.c.) 40 parts; Potassium bichromate 1 part. Keep in dark. Mix before use.

2147 G.D.S., Savli—For castile soap powder and sodium perborate enquire of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta.

2157 .RN., Faizabad—Shellac may be had of A. M. Arathoon & Co, Ltd., 11, Stephen House, Dalhousie Square; Aberi Lucas & Co., 13, British Indian Street; Angelo Bros. Ltd., 6, Lyons Range and Bansal Brothers Ltd., 14-4, Clive Row; all of Calcutta.

2158 S.I.L., Tiruchirapalli—You may take up manufacture of brass hinges and screws, and other fittings.

2159 G.T.C., Meerut City—For Derby tickets enquire of Royal Calcutta Turf Club, 11, Russel Street, Calcutta.

2160 A.N.C., Darbhanga—Following is a list of railway bookstall holders: A. H. Wheeler & Co., 15, Elgin Road, Allahabad and Higginbothams & Co., Post Box 311, Mount Road, Madras.

2161 R.I., Kakinada—For bucket making machines write to Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta. We have no book on bucket manufacture. Process of galvanising will be found in Electroplating In Practice, published from this office, price Rs. 3/7/- including postage. You may also engage a mistry who will help you to manufacture out of sheets.

2162 J.S., Bansjora—There is no film art school in India at present.

2163 V.S.F., Bandikui—All kinds of oils and sodium silicate may be had of Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane, Calcutta.

2167 J.E.W., Amritsar—You may consult Manufacture of Rubber Goods published from this office, price Rs. 3/7/- including postage.

2173 S.T.C., Bombay—Following is a formula of motor grease: Tallow 25 parts; Mobil oil 70 parts; Caustic soda lye 40°Be 10 parts. Melt the tallow over fire and add the caustic lye. Boil to saponification. Then incorporate the mobil oil and keep aside to cool.

2174 P.S.K., Indore—Following is the process of manufacturing emery stone: Emery stones are prepared with emery powder using magnesite as binding medium. The feature of this process is that the pulpy mixture of magnesium chloride solution, magnesite and emery powder is placed in metal moulds, which are mounted on jig table, the vibration of which causes the specifically heaviest portions of the mixture viz. the grains of emery to settle down gradually to the bottom of the mould. Compactly as possible, each grains having time assume the most suitable position with regard to its neighbours. This process gives an emery stone consisting of 90 per cent emery and only 10 per cent of magnesite building medium, the superfluous portion of the latter being forced upward by the jumping movement of the table, and then easily removed.

2175 B.D.B.P.C., Kanpur—You may negotiate with the following forwarding agents for exporting bristles to Japan: Banerjee & Co., 2-1, Roy Bagan Street; Bysack's Landing & Shipping Agency, 26-A, Netaji Subhas Road and Calcutta Shipping Bureau, Room 8, Custom House; all of Calcutta. The above firms will supply you detail information regarding forwarding charges, etc.

2176 T.N.S., Mhow—You better consult a physician for ascertaining the uses of pharmaceutical preparation mentioned by you. Pancreatin and pepsin have no substitute.

2177 M.M.F., Mavelikara—Some of the chemicals used by you are hygroscopic; so they absorb moisture from atmosphere. Hence it takes time to dry the match head composition.

2180 G.R.S., Kalimpong—For knitting wool you may write to the following firms: Anglo-Continental Wool Co. Ltd., 19, Salem Street, Bradford; Haddon & Co., 33, Cheapside, Bradford,; all of England.

2181 G.P.S., Banaras—For obtaining thick durable coating on aluminium acid strength should be 10 per cent. bath temperature 25°C., voltage 10-12 D.C. amp. 1.4. You may consult Manufacture of Syrups and Cold Drinks, published from this office, price Rs. 3/7/- including postage.

2182 U.N.S.B., Nasirabad—We have no book on the uses of tamarind seeds and their use in starch manufacture. Upper coating of the tamarind seeds are removed and ground to fine powder.

2183 A.H., Barpeta Road—Addresses of jute mills appear under No. 2032.

2184 M.S.T.M.C., Hindupur—There is no Government institution where optical, watch repairing, photography, confectionery, etc. are taught. There are some private institutions where training is given on some of the subjects.

2185 C.E.C., Calcutta—Following is a list of rubber shoe manufacturers: Asiatic Rubber Works Ltd., 54-D, Chingreehatta Road, Calcutta; Bata Shoe Co. Ltd., Batanagar, 24 Parganas; Bharat Rubber Works Ltd., B. T. Road, Kamarhati, 24 Parganas; Bhattacharya Rubber Works, 174, Jessore Road, Dum Dum, 24 Parganas; East India Rubber Works Ltd., 3, Stark Road, Lilooah, Howrah; Hindusthan Rubber Works, 243-1, Kasba Road, Ballygunge, Calcutta and Imperial Rubber Works, 1 Paymental Garden Lane, Calcutta. An exhau tive list of rubber shoe manufacturers will l found in Industry Year Book & Directoi published from this office, price Rs. 16/4 including postage.

2188 E.M.T., Karachi—Recipe of pater and proprietory medicine is not available.

2189 P.F.L., Calcutta—For sago makin plants enquire of Oriental Machinery Supplyin Agency Ltd., P12, Mission Row Extension Calcutta.

2190 K.S.S.C., Tinsukia—For tin can making machines enquire of Alfred Herber (India) Ltd., 13/3, Strand Road, Calcutta and Marshall Sons & Co. Ltd., 99, Netaji Subhas Road, Calcutta.

2193 H.B., Jullundur City—Formulas and processes of polish will appear in Formula section in due course.

2194 M.C.I.C., Gulbarga—Following is a list of glass bottle manufacturers: Bengal Glass Factory, 106, Khengrapatty Street; Glass Products Ltd., 56, Belgachia Road; Jayanti Glass Works Ltd., 8, Ezra Street, and Victoria Glass Works, 130, Mechua Bazar St.; all of Calcutta.

2195 D.P., Hazaribagh Road—Following is a recipe of pimple lotion: Crystallised alum 1 lb.; Spermaceti 2 lbs.; Sublimed sulphur 1 lb.; Sugar candy 2 lbs.; Sodium chloride 1 lb.; Rose water 3 lbs.; Distilled water 3 lbs.; Alcohol 10 lbs. Reduce all the solids into fine powder and rub up with the mixed liquids. This lotion is to be applied at intervals during the day upon linen rags, which should frequently for eruptions on the face. Chemicals and other ingredients may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta.

2196 T.P., Cuttack—Formulas of hair oils will be found in Indian Perfumes, Essences and Hair Oils in chapter on scented Hair Oils.

2197 M.M.S.K.R., Bariupur—Salt is used for coocking purposes, making pickles, chutneys, etc. and food for cattles beside the various industries mentioned by you.

2198 B.S.R.M., Puri—You may start soap manufacture with Rs. 5000/- as initial capital.

2199 B.G.I., Bettiah—For wooden types enquire of the following firms: Silpa Art Co., 360, Upper Chitpur Road; Bharat Silpa Kuti, 361, Upper Chitpur Road; both of Calcutta.

2200 R.K.M., Hoshangabad—It is not possible to start a spinning mill with Rs. 10000/- only. Sago is manufactured from starch. For sago making machines enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. Camphor is moistened

with alcohol and then pressed and made into tablet.

2203 B.J.B.A.E.M., Tanganyika—You may start soap manufacture with Rs. 3000/- on a small scale; Rs. 1000/- for equipments; Rs. 1000/- for raw materials and Rs. 1000/- as reserved fund.

2204 N.L.K., Agra—Brushes are manufactured mainly in Calcutta and U.P. There are also brush factories in Bombay and South India. This industry has good prospect.

2205 D.G.C., Ahmedabad—For all sorts of handloom products enquire of the following firms: Ashok Weaving Works, Chovva, N. Malabar; C. Aaran & Sons, Pappiniseri, Malabar; Dhanalakshmi Weaving Works, Kakkat, Cannanore, N. Malabar; Manohara Weaving Works, Chovva, N. Malabar; Sri Moonakshi Mills Ltd., Mynatappa Kulam Street, Madura, and West Coast Weaving Estt., Chovva, Cannanore, Malabar.

2206 R.B.C., Dharmanagar—Process of bamboo pulp making appeared in October 1950 issue of Industry.

2207 S.R.W., Singapore—Your query is unitelligible.

2208 P.T., Layang Layang—Steel trunks may be had of Arya Bhander, 90-2A, Harrison Road, Y. M. C. A. Bldgs.; Bysack Factory, 8, Braja Dulal Street; National Trunk Manufacturing Co., 12, Old China Bazar Street and Sitala Factory, 9A, Harrison Road; all of Calcutta. For suitcases enquire of Bangaluxmi Leather Works, 10B, St. James Square; Babu Factory, 75/1, Harrison Road and Chowdhury & Sons, Old China Bazar Street; all of Calcutta. Aluminium wares may be had of Aluminium Corporation of India Ltd., 9, Netaji Subhas Road; Aluminium Manufacturing Co. Ltd., 4, Fairlie Place; Aluminium Production Co. of India Ltd., 5, Council House Street and Asok Metal Industries Ltd., 62, Netaji Subhas Road; all of Calcutta.

2209 P.B.G., Dhrangadhra—You may take up knitting and embroidery works as home industry. Following is a recipe of Gund Kanku: Carmine 5 parts; Gum arabic 8 parts; Water 10 parts. Dissolve the gum in cold water and incorporate carmine. Following is a formula of liquid depilatory: Sodium sulphide 14 oz.; Rectified spirit 4 oz.; Glycerine 1¼ lbs.; Lavender oil 1 oz.; Water 10 lbs. Dissolve the sulphide in some of the water; and finally the lavender oil, dissolved in the spirit, mix well and filter. Thread button and thread balling machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. For paper-bag making no training is required. Book binding machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. Book binding materials may be had of B. C. Patel & Co., 143, Princess Street, Bombay and Basu Brothers, 14/2, Old China Bazar Street, Calcutta.

2212 J.C.I., Delhi—You may consult Industry Prize Articles published from this office, price Re. 1-15 including postage.

2213 A.P., Masulipatam—For magnesium wire enquire of Bonbonniere, P. O. Box No. 10827, Calcutta.

2214 B.E.C., Ranchi—Add sufficient water to the shellac spirit solution when the shellac will precipitate. Now you may obtain spirit by fractional distillation.

2215 N.B., Calcutta—You may start soap manufacture, lozenge manufacture etc. with Rs. 5,000/-.

2216 P.S.P., Gobi—For particulars regarding overseas training write to High Commissioner for India, India House, Aldwych, London W. C. 2.

2217 N.A.P.S., Alamoor—Photo goods may be had of Photographic Stores & Agency Co. Ltd., 154, Dharamtala Street, Calcutta; Calcutta Camera House, 37, Dharamtala Street, Calcutta and Bathgate & Co., 17, Old Court House Street, Calcutta.

2218 I.S.C.C., Katalur—Success of any industry mainly depends upon the quality of products. Defective machines and dearth of technical knowledge are mainly responsible for defective products. If you intend to start a pencil factory you should use efficient machine and take help of expert technician.

2222 S., Lucknow—Address of all-India Board of Technical studies is New Delhi.

2224 W.C.I., Wardha—If you add 3 mds. of sodium silicate to one maund of oil the soap manufactured will be inferior quality and will not produce good lather.

2225 R.M., Chamanganj—For technical books enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East and W. Newman & Co. Ltd., 3 & 4, Old Court House Street; both of Calcutta.

2226 B.K.K., Kanpur—Formulas of water colour cake and chalk crayon will appear in due course.

2227 M.H.W., Kanpur—For boot and shoe lace making machines enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension; and W. H. Brady & Co., Ltd., Mercantile Bldg., Lall Bazar; both of Calcutta.

2228 J., Meerut—Radio cabinets of plastic are not manufactured in India. Formulas of cement for glass, celluloid and plastic will appear in due course.

[illegible]—Following is a list of steamship companies: Asiatic Steam Navigation Co Ltd., 6, Lyon's Range; American Export Lines Inc., D-1, Clive Bldgs.; Mackinon Mackenzie & Co., 16, Strand Road; Grahams Trading Co. Ltd., Shipping Department, 6, Lyons Range; Turner Morrison & Co. Ltd., 6, Lyons Range; James Finlay & Co. Ltd., Post Box 209 and Lionel Edwards Ltd., D-1, Clive Bldgs.; all of Calcutta.

2230 D.T.C., Dehra Dun—You may add rose water to the supari and glycerine

2232 C.D.M.S., Nagpur—Particulars regarding adsorbent cotton will appear in due course.

2235 K.S., Bangalore City—Recent investigation have shown that most of the variation in performance of polishing wheels is directly due to faulty drying. Binding agent develops its maximum strength when allowed to set slowly and naturally. The dry room temperature should not exceed 85°F. Wheels should be thoroughly dry before they are used. Forty eight hours is necessary for a binder to set. If used before it is thoroughly set, the wheels will wear out too fast.

2236 P.K.G., Ramporehaut—For tea write to the following firms: Bhaman Tea Estate Factory, Khowang, Lakhimpur; Dalmukhia Tea Estate Factory, Marlani, Sibsagar; Khongea Tea Estate Factory, Rajmaih, Sibsagar; Happy Valley Tea Estate, Darjeeling; Jharboo Tea Estate, Mirik, Darjeeling; Namring Tea Estate Factory, Rungli, Ranglikot, Darjeeling; Poobong Tea Estate Factory, Ghoom, Darjeeling; Sath Kyah Tea Factory, Mal, Jalpaiguri; Soonagachi Tea Estate Factory, Mal, Jalpaiguri and Samsing Tea Factory, Matelh, Jalpaiguri. It is not possible to supply all the addresses of tea estates. You may however consult Industry Year Book & Directory published from this office, price Rs. 16/4/- including postage. Wants to be put in touch with the suppliers of cane chairs and tables. For selling kapok you may negotiate with Bhaduri Bros. Ltd., 95, Akhil Mistry Lane, Calcutta.

2237 J.E.W., Dhanbad—Process of making lens will appear in due course.

2240 A.S.B., Nigeria—For extending business in your country and in India you should advertise in local papers.

2241 T.C.A.R.C.S., Madura—Process of manufacturing face powder and other toilet goods will be found in Manufacture of Toilet Goods published from this office, price Rs. 4/8/- including postage. Tin cans may be had of National Sheet & Metal Works, 36A, Sahitya Parishad Street and Bengal Tin Box Mfg. Co. Ltd., 1, Jadu Mitter Lane: both of Calcutta. Process of manufacturing carbon sheet will appear in due course.

2242 B.M., Fyzabad—For books on flour making enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta and Standard Literature Co. Ltd., 13/1, Old Court Street, Calcutta.

2243 A.C.R., Kumbakonam—For selling the goods you deal in advertise in our magazine. It is very difficult on our part to suggest names of prospective buyers.

2244 [illegible], Kumbakonam—Address National Library is Belvidere, Alipore, Calcu[tta]. Process of colouring iron will appear in [due] course.

2245 V.V.R., Samalkot—You may st[art] bucket manufacture. For bucket mak[ing] machines enquire of Alfred Herbert (India) L[td.] 13/3, Strand Road, Calcutta and Francis Kl[ein] & Co. Ltd., 1, Royal Exchange Place, Calcut[ta]

2247 G.I., Bombay—Process of manufact[ur]ing ink and office paste appeared in April 1[9..] issue of Industry.

2248 D.H.S., Gwalior—Washing soda m[ay] be had of Imperial Chemical Industries (Indi[a]) Ltd., 18, Strand Road, Calcutta.

2250 G.J., Tuticorin—Assafoetida is [ex]tracted from a species of herb which is fou[nd] wild in Eastern Persia, Kharsan and oth[er] localities. It prefers a stony arid soil and [is] found at an altitude of 7000 ft. This is obtain[ed] by wounding the upper part of the root, fro[m] which a small quantity of gum escapes and [is] collected. The living root is then sliced dai[ly] or every two or three days with the exudati[on] adhering to it, till exhausted. Whole ma[ss] consisting of alternate layers of root and gu[m] resin is packed in skin. As found in the mark[et] the resin consists of blackish brown brittle ma[ss] of extremely fetid odour, always mixed wi[th] slices of the root. Benzoin is a balsamic re[si]nous exudation from styrax benzoin, dryande[r] and other species of N. O. styraceal, trees nati[ve] to Siam, Sumatra and Java.

2251 B.P.W., Kanpur—For aluminiu[m] bottles enquire of Aluminium Corporation [of] India Ltd., 9, Netaji Subhas Road, Calcutta[;] Indian Aluminium Co. Ltd., 5, Council Hous[e] Street, Calcutta and Jeewanlal (1929) Ltd., 3[.] Netaji Subhas Road: all of Calcutta.

2254 J.P., Nidadavole—Thymol manufa[c]ture requires distilling plant which may be ha[d] of Adair Dutt & Co., Stephen House, 4, Dalhousi[e] Square, Calcutta. Confectionery machines ma[y] be had of Small Machineries Mfg. Co., 22, R. C[.] Kar Road, Calcutta. It is not possible to manu[]facture artificial menthol as home industry.

2256 J.C., Kanpur—You should advertis[e] for doing business in medicine. You may als[o] appoint agents in prominent towns. For rubbe[r] stamps in Hindi and English enquire of I[...] Goray & Co., 156, Cornwallis Street; Dhur & Co[.] 3/2, Kartick Bose Lane and H. C. Bysack, 4-1

[illegible] Chatterjee Lane; all of Calcutta. For [illegible] accessories enquire of French Universal Talkie Equipment, 36, Dharamtala Street, Calcutta, and International Talkie Equipment Co., 17, New Queens Road, Bombay 4.

2257 A.B.M., Porbandar—It is not possible to manufacture slate pencil with whiting.

2258 N.G.V.C., Murtazapur—Formulas of ink powder appeared in April 1950 issue of Industry. It is not possible to manufacture face powder from soapstone. Following is a formula of charcoal tooth powder: Charcoal 350 grams; Precipitated chalk 600 grams; Camphor 45 grams; Menthol 5 grams; Cassia Oil 5 c.c.; Cinnamon oil 5 c.c. Powder the solid ingredients thoroughly. Then mix them with the essential oils. For manufacturing nib you have to alter and make suitable arrangements.

2259 R.J.P.C., Ahmednagar—Formulas of nail polish, chocolate, toffee, etc. will appear in due course.

2260 J.P.S., Patna—Ink making chemicals may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane; Banshidhar Dutt, 126, Khengrapatty Street and Fuzle Hussein & Bros., 44, Armenian Street; all of Calcutta.

2261 S.N.S., Meerut—You may start the following industries with small capital: Soap, ink, phenyle, etc. Processes will be found in April, 1950 issue of Industry.

2263 P.L.S.C., Bulandshahr—Refer your query regarding wood to the Supdt., Forest Research Institute, Dehra Dun.

2265 R.P.S., Monghyr—We are not aware of any such journal.

2268 P.E.W., Bulsar—You may correspond with the Iron and Steel Controller, 33, Netaji Subhas Road, Calcutta.

2271 W.P., Warangal—Reply to your query appear under No. 2021.

2274 S.N.B., Jagadhri—Collapsible tubes may be had of Metal Box Co. of India Ltd., B2, Hide Road, Kidderpur, Calcutta.

2285 K.T.Y., Kalimpong—You may consult Safety Matches and Their Manufacture by K. C. Das Gupta, published from this office, price Rs. 5/8/- including postage. We have no book on wool industry. Match making machines may be had of Standard Machinery Co., 67-B, Netaji Subhas Rd., Calcutta. Match chemicals may be had of Allied Agency, 46, Bonfield Lane, Calcutta.

2286 S.R.M., Kumbakonam—Process of manufacturing copper ammonium chloride will appear in due course.

2287 R.P.J.L., Jodhpur—For wood screws, rivets, etc., write to S. N. Mullick & Co., 144-2, Narasingha Dutt Road, Howrah; Tosh Iron Works, 37, Chetla Road, Calcutta; Universal Engineering Co., 14-2, Old China Bazar Street; Calcutta; P. C. [illegible] Subhas Road, Calcutta and [illegible] Rivets Ltd., 233, Belilios Road, Howrah.

2288 N.K.S., Darbhanga—A formula of similar product like balamrita will appear in due course.

2289 S.K.M., Bombay—Ice candy is manufactured in an ice candy making machine which may be had of M. A. Nasiri & Co., 139-10, Nagdevi Street, Bombay, and N. Peer Mohamed & Co., 191, Dhahor Street, Bombay. Following is a formula of biscuit: Flour ½ lb.; Carbonate of soda 15 gr.; Sugar 2 oz.; Milk 4 oz.; Butter 4 oz. Beat the butter and add the flour. Incorporate the soda and knead the whole into a dough with milk. Make the mass into rod like roll; cut out pieces one inch thick; make incisions into them; bake and pack air tight.

2290 F.K.N.G., Bombay—For plastic sheets and rods enquire of Oriental Import and Export Agency, 52, Shri Krishna Nivas, New Silk Bazar, Kalbadevi Road, Bombay; Popular Plastics, Ruby House, Opp. Colaba Tram Terminus, Bombay 5 and Nutex (India) Ltd., Devkaran Mansion, Princess Street, Bombay 2.

2291 R.N.P., Sarharwa—Following is a list of ghee merchants: Bajranglall Agarwalla & Co., 151, Cotton Street; Gourabendra Nath Kundu & Co., 13, Doyehatta Street; Lala Nandkishore, 3, Ram Kumar Rakshit Lane; Panchanon Ash, 26, Ram Kumar Rakshit Lane and Mahananda Dutt & Co., Ltd., 2A, Ram Kumar Rakshit Lane; all of Calcutta.

2292 B.S., New Delhi—Tempering is a very difficult process which requires practical training so you should advertise in newspaper for securing an expert who will help you in tempering.

2294 P.N.L., Raigarh—Slate pencil and capsule making machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. For hosiery goods enquire of the following firms: Kalighat Hosiery Factory, 231, Rash Behari Avenue; Pabna Hosiery Mills Ltd., 2, Dutta Para Lane; Pabna Silpa Sanjibani Co. Ltd., 5, Paymental Garden Lane and Parjoar Hosiery Mills Ltd., 63, Belgachia Road; all of Calcutta.

2295 H.S., Fakirgram—Process of preserving fruit and curling hair will appear in due course. For hosiery manufacturers see under No. 2294 above.

2297 B.M.L.B., Delhi—Formulas of fountain pen ink appeared in April 1950 issue of Industry. Other formulas will appear in due course.

2298 K.C.K., Ghurkari—It is not possible to separate oil seed shells from oil cakes.

[illegible] [illegible] by [illegible] unless the [illegible] recognised by Government nor by a University.

[illegible] K.D.S., Solon—For mica write to [illegible] Mica Mining & Prospecting Syndicate, Diggi Bagh, Jaipur City; Pioneer Mica Mining & Manufacturing Co., 32, Gopi Kristo Pal Lane, Calcutta; Bengal Mica Corporation, Kodarma, Hazaribagh and Chota Nagpur Mica Syndicate, Kodarma, Hazaribagh.

2301 A.K.S., Darbhy—Formulas and processes of snow, alta and powder appeared in April, 1950 issue of Industry.

2302 V.V., Karaikudi—Dissolve the alum crystals in as little warm water as possible, then keep undisturved when the whole will be a complete block.

2314 N.B.I., Jullundur City—We have no book on paint and pigment and ores and minerals.

2315 B.M.H., Balasore—For glass chimney enquire of F. Racek & Co., 57, Radha Bazar Street; Kristo Ch. Dutt & Co., 206, Old China Bazar Street and Radha Kanta Das & Sons Ltd., 211, Old China Bazar Street; all of Calcutta. Slate and slate pencils may be had of Markapur Slate Works, Markapur, Kurnool and Sri Vivekananda Swadeshi Slate Works, Markapur.

2316 M.D.R., Lohardaga—Soap dies and other machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

2317 S.H.A., Amritsar—We have not a directory containing addresses of libraries and reading rooms.

2318 S.C.S., Allahabad—You may read some upto date books on business organisation and company management. For the books enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East and W. Newman & Co. Ltd., 3 & 4, Old Court House Street; both of Calcutta.

2320 S.S.W., Baidyanath-Deoghar—Soap cannot be bleached. For producing white soap you should use only coconut oil.

2321 A.V.K.N., Karur—Process of manufacturing solid benzoin, camphor, etc. will appear in due course.

2322 J.B.R., Cannanore—For boot lace making machine enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

2323 G.K.P., Kalyan Camp—Formulas of sparklers, rockets, etc. appear in October 1950 issue of Industry.

2324 S.B., Banmor—You may use oleum cantharidin, rosemary oil and castor oil for preventing fall of hairs.

2325 B.S.M., Hubli—Process of refining tallow will appear in due course.

[illegible] [illegible]—Following is a list of printing machine dealers: [illegible] Trading Co. Ltd., P[illegible], Mission Row Extension; John Dickinson & Co., [illegible], Clive Row, and Printing & Industrial Machinery Ltd., Windsor House, P[illegible] Bentinck Street; all of Calcutta. You may enquire of the above firms regarding details of different types of printing machines.

2333 J.L.B., Dacca—Cigarette making and plastic machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

2334 M.S., Titron—Two volumes of Industry Prize Articles have been published, price of which is Re. 1-15 each. Address of Japanese Trade Commissioner is not available.

2335 B.N.S., Arrah—Process of making rabri will be found in Bengal Sweets which you have already got.

2336 R.L.K., Ambala Cantt.—For carbonising compound enquire of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta.

2343 T.K.S.R., Pondicherry—Process of cloth printing appeared in October, 1950 issue of Industry.

2345 V.D.W., Coimbatore—Vide No. 2343 above. Following is a list of dye merchants: Dolatram Kashiram & Co., Khan Mohamed Kashiram Bldgs., Thakurdwar Road, Bombay 2; Nanavati & Co. Ltd., 16, Apollo Street, Fort, Bombay; Paramount Dyes & Chemicals Ltd., Elphinstone Bldg., Church Gate Street, Bombay and S. K. Kabbur Ltd., Industrial Insurance Bldg., Opp. Church Gate Street, Fort, Bombay.

2346 H.N., Darjeeling—Wood will not mix with ordinary plastic powder. But with special kind of plastic powder wood flour is mixed. Sawdust should be further ground to make wood flour.

2347 G.B., Bareilly—Process of manufacturing snow will be found in April 1950 issue of Industry. Following is a formula of tooth powder:—Precipitated chalk 35 parts; Magnesium carbonate 25 parts; Borax 14½ parts; Sodium bicarbonate 14 parts; Soap powdered 4 parts; Sugar powdered 7½ parts; Methyl salicylate ½ part; Menthol 1/10 part; Cinnamon oil 1/5 part. Dissolve the menthol in the methyl salicylate, add the cinnamon oil and then add to borax and mix with sugar. Add the other ingredients; mix and sift.

2348 S.K.M., Bombay—You better consult A. Mitra & Co., 5-2F, Raja Rajballav Street, Calcutta regarding company matters.

2349 T.N.R., Patna City—Glucose may be had of Dalmia Jain & Co., Ltd., 9, Dalhousie Square East, Calcutta.

2356 N.N., Amritsar—Process of manufacturing nylon will appear in due course.

2357 R.K.C., Lashkar—Following is a recipe of skin ointment:—Sublimed sulphur, finely sifted 4.5 grms.; Resorcinol, finely sifted 3.0 grms.; Yellow soft paraffin 22.5 grms. Mix.

2358 V.R., Kakinada—For chromium plasting ingredients enquire of Alfred Herbert (India), Ltd., 13-3 Strand Road, Calcutta. For lathes and other machines enquire of T. E. Thomson & Co., Ltd., 9, Esplanade East, Calcutta.

2359 M.S.M., Sangli—For safety pin making machine write to Baird Machinery Co., Bridgeport, Connecticut, U.S.A.

2360 D.C.G.K., Salem—To make essence of assafoetida it is digested first in alcohol, and afterwards in weak spirit and water, the residuum should not exceed 16 p.c. s.p.; gravity should be 1.325 to 1.330.

2372 H.S., Tonk—Process of manufacturing transformer etc. will appear in due course.

2373 N.I., Katni—All kinds of waxes may be had of Banshidhar Dutt, 126, Khengrapatty Street and Calcutta Chemical Co., Ltd., 10, Bonfield Lane; both of Calcutta. Bismark brown may be had of Fuzle Hussein & Brothers, 44, Armenian Street, Calcutta, and Champalal Agarwala, 45, Armenian St., Calcutta.

2375 G.C.P., Cuttack—Wants to be put in touch with suppliers of fish powder and bone powder.

2376 W.S.B., Kalsia—Machine for making rope out of grass is not available. You may however enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

2383 P.S.P., Coimbatore—Regarding sugar research write to the Director, Indian Institute of Sugar Technology, Nawabganj, Kanpur.

2384 R.P.W., Ambala—You may consult Tablet Making by Arthur Little and K. A. Mitchell published by The Northern Publishing Co., Ltd., 37, Victoria Street, Liverpool 1, England.

2385 M.N.D.G., Jamshedpur—Artificial hatching of eggs will be found in books on Poultry Farming. You may enquire of W. Newman & Co., Ltd., 3 & 4, Old Court House Street, Calcutta, and Thacker Spink & Co. (1933), Ltd., 3, Esplanade East, Calcutta for books on poultry farming.

2386 J.E.C., Nadiad—Address of Greaves Cotton & Crompton Parkinson Ltd., is 4, Mission Row Extension, Calcutta.

2387 S.K, Chhapna—For liquid ammonia fort enquire of Calcutta Chemical Co., Ltd., 10, Bonfield Lane, and Butto Kristo Paul & Co., Ltd., 1 & 3, Bonfield Lane; both of Calcutta.

2388 A.S., Ernakulam—Process of manufacturing poster colour will appear in due course.

2390 I.K., Rajkot—For galvanising plant write to Alfred Herbert (India), Ltd., 13-3, Strand Road, Calcutta. Process of making paint for slates and enamel paint will appear in due course.

2392 V.D., Jammu—Process of making alloy will appear in due course.

2393 O.M.D., Coimbatore—Refer your query to the American Trade Commissioner, 9-10, Esplanade Mansion, Calcutta.

2401 B.D., Hatikhira—For selling nux vomica you may negotiate with Banshidhar Dutt, 126, Khengrapatty Street, Calcutta and Indian Herb Store, 31, Mullick Street, Calcutta.

2402 S., Lucknow—Following is a list of paper mills:—Andhra Paper Mills Co., Ltd., Rajahmundry; Bengal Paper Mills Co., Ltd., 103, Netaji Subhas Road, Calcutta; India Paper Pulp Co., Ltd., 8, Clive Row, Calcutta; Orient Paper Mills Ltd., 8, Royal Exchange Place, Calcutta; Titaghur Paper Mills, Chartered Bank Bldgs., Calcutta, and Star Paper Mills Ltd., Saharanpur, U.P. Following is a list of paper merchants: John Dickinson & Co., Ltd., 6, Clive Row; Bholanath Paper House Ltd., Kusum Smriti, 21, Beadon Street; Mukherjee Dutt & Co., 31, Jackson Lane, and Raghunath Dutt & Sons Ltd., 33-2, Beadon Street; all of Calcutta. For imported ink enquire of Nilmony Halder & Co., 11, Chittaranjan Avenue; Queen Stationery Stores Ltd., 63E, Radha Bazar St.; Mitra Bros., 23, Canning Street, and Students Stores, 154, Old China Bazar Street; all of Calcutta. Ink may be had of A. Chowdhury & Co., 15, Clive Row; Calcutta Miscellany, 12, Ghosh Lane; Chemical Association, 55, Canning Street and P. M. Bagchi & Co., 19 & 19-1, Gulu Ostagar Lane; all of Calcutta.

2403 S.J.C., Mombasa—Following is a process of manufacturing sugar candy: Sugar candy is prepared from a saturated solution of sugar, formed by adding sugar to boiling water till it dissolves no more. The solution is then run into troughs, in which it is allowed to cool slowly, while a number of threads are hung in the liquid upon which the crystals form and continue to grow. The time required will depend on the bulk of sugar treated. In working on a small scale, it will be necessary to remove the strings and adhering crystals; then add more sugar to the liquid, boil up, and immerse the strings while the liquid is cooling. Cakes and candy will also separate on the sides of the vessel in which the liquid cools.

2405 R.I., Amritsar—Process of nickel plating appeared in November 1949 issue of Industry.

—REVIEW OF BOOKS

OUTLINES OF BOOK-KEEPING by Amalendu Chatterjee, B.A., B.Com., R.A., Prof., Vidyasagar College. Published by The Readers Corner, 5, Sanker Ghosh Lane, Calcutta 6. Pages 179, price Rs. 3-12.

The book is intended for the Intermediate students of commerce of the Calcutta University and offers a lucid exposition of the principles underlying the modern practice of book keeping. The subject has been treated in a direct way to be easily understandable by the students. Even businessmen, who have got to keep accounts and to understand the implications of the various records of the account books as noted by the accounts clerk, will find the book helpful in their day-to-day work.

SECRETARIAL PRACTICE IN INDIA by J. C. Bahl, B.A., M.Com., B.E.S., Sydenham College of Commerce and Economics, Bombay. Published by N. M. Tripathi Ltd., Law Publishers, Princess Street, Bombay 2. Pages 384, price Rs. 6-8.

Besides the statutory duties appertaining to the post of the Company Secretary, he has got certain definite duties to the directors, certain duties to the shareholders and the public, and certain duties relating to the organisation of the office. He should possess a thorough knowledge of the Indian Companies Act and the obligations under the above Act. He should maintain in order the various documents of the company, minute books, share registers, formation and winding up of companies etc., etc. He should know in full the procedure to be followed in convening and conducting directors' meetings. He should have at his disposal the various forms used in the routine transactions of the Joint Stock Companies. The book under review contains valuable information on these and allied subjects and gives directions about procedures to be followed on various complicated matters. The treatment of the book is from a practical standpoint of view and lays special stress on the practical application of the Indian Companies Act. The book contains a number of specimen draftings, forms and letters which the secretaries will find helpful in their daily round of duties. Management of a Company and keeping of account books have also received due share of attention. Though the book has been specially written for commerce students preparing for the B.Com. and M.Com. examinations and covers the full course of Secretarial Practice, it will equally serve as a handy book of reference to all would-be and acting company secretaries.

ORGANISATION OF WORKING HOURS IN THE CHEMICAL INDUSTRIES. Published by International Labour Office, Indian Branch, 3, Jantarmantar Road, New Delhi.

The Report considers the ways in which the various countries have tackled problems connected with hours of work in chemical industries as come within the Committee's scope. Following a brief indication of the normal organisation of hours of work in the chemical industries, the Report discusses the special aspects of the organisation of hours of work in these industries, e.g. the calculation of working time, the distribution of the hours of work, the system of breaks, especially those allowed for meals, two-shift work, etc. and such special provisions. The problems raised by the overtime system, its duration and remuneration have also been discussed. According to the Report the wage increase in respect of overtime varies according to the duration and the time or day when it is worked. The average rate appears to be about 50 per cent. for overtime on working days and about 100 per cent. for overtime on Sundays, holidays, or rest days. The overtime increase is usually based on the real wage, that is, the wage constituted by the basic rate and the compensatory allowances, at any rate those which are not of a personal nature. In several countries, however, only the basic wage is taken into consideration. In order to avoid putting the worker to the inconvenience of working overtime for a period so short as to be hardly worth his while, many agreements or arbitrary awards provide that he shall be paid for at least a specified number of hours, generally not less than two.

R. C. C. DESIGNING MADE EASY by R. S. Deshpande, B.E., B.S.E. (Retd.), A.M.I.E. Published by United Book Corporation, Poona. Pages 500, price Rs. 10.

The book is intended to supply the needs of the students studying for degree courses of Indian Universities in R.C.C. It presents the essential principles and current practice of design of reinforced concrete structures in easy style with numerous examples worked out. Assumptions forming the basis of R. C. C. design and the extent upto which they hold true in practical construction, stress strain relation of concrete, etc. have been explained in full. The book gives the manner of designing floor slabs, beams, tees, columns, stair cases, circular tanks, retaining walls, etc., etc. The book is fully illustrated and well got up. The book should prove an excellent guide to the readers on R. C. C. designing.

THE CHRONOGRAPH: ITS MECHANISM AND REPAIR. Published by the Journal Suisse D'Horlogerie at De Bijouterie Lausanne, Switzerland. Official agents for India, Burma and Ceylon: Yoron Service Bureau, 4348, Bhairon Street, Egerton Road, P.B. 1356, Delhi, India, Price Rs. 30.

This volume, written by Mr. B. Humbert, Professor of the Special Chronograph Courses at the School of Watchmaking of Bienne, Switzerland, is interesting not only for persons who use chronographs, but more especially for those who execute and repair them. The au-

and then the continuous, semi-instantaneous and instantaneous stop-watch chronograph. Then comes the explanation of the hour registers and of the various chronographs: of the so-called "oscillating" pinion; without column wheel; with friction drive; with centre hand. Several chapters are given over to the single hand split-second chronograph, stop-watches with the various divisions of the dials.

Using a great number of figures, the author explains the forms and dimensions of the different parts, their respective positions, and how they are to be adjusted as well as the defects which occur most often. He speaks very clearly and at length of the corrections to be made in the case of a defective part so that there is no possibility of its not executing exactly and dependably the function for which it was created. How the watchmaker should proceed with the examination, cleaning, repairing and checking of chronographs have been fully explained in the book. After having read the book, the reader will know where to look when a chronograph stops or does not work properly. In fact the volume is a vade-mecum for watchmakers.

BRITISH ENGINEER'S ASSOCIATION CLASSIFIED HANDBOOK OF MEMBERS AND THEIR MANUFACTURES (1950 Edition). Published by the British Engineers' Association, 32, Victoria Street, London, S.W.1. Pages 655.

The Directory is a stoutly bound volume embodying a comprehensive classified list of manufacturers. The Foreward deals with progress in the engineering industry and pays tribute to the work of the research organisations which serve the industry. The Volume will be of great assistance to purchasers of engineering equipments.

NOTICES & REVIEWS

(Manufacturers sending specimens and samples of their products for notice and review may please note that no notice is published of medical preparations and allied substances in this section.)

MADRAS SNUFF

We have received from Dass Brothers, 4-1, Becharam Chatterjee Lane, Calcutta 5 one sample tin of No. 1 N. J., Madras Snuff (Raw) of good quality.

PRINTED CLOTH LABELS

We are glad to receive from Wahab's Agency, Khilos, Saurashtra, a few specimens of printed cloth labels of attractive designs.

BLUE-BLACK WRITING INK

We have received sample of blue-black writing ink from Viswa Sambhar 5, Tobin Road, Baranagore Calcutta 36. Quality of the ink is quite satisfactory.

A BOOK ON GOD-REALISATION

"Paramatmadarshan" by Jitendra Nath Sen, in Bengali, attempts to present within a small compass in simple style the philosophic basis of the various systems of religious practices for the realisation of the Absolute Godhead and offers valuable instruction with the help of which a spiritual aspirant can advance step by step. An understanding of the philosophic aspects of the teachings incalcated in the Geeta, Chandi, Upanishads etc. is essential for those who long after a higher spiritual life and in this respect the book will serve a useful purpose. The author explains that so long as Jivas like to enjoy the multifarious mundane experiences a Benign Force, like an affectionate mother, carries him in her bosom through the continuous cycles of life and death for the fulfilment of their heart's desire and as soon as they get tired of the worldly experiences and show a craving for emancipation the Mighty Force extricates them from worldly bondage and absorbs them in Her bosom. The book all through makes interesting reading. Price of the book is Re. 1-8. The book is available from the Author at 55, Suburban School Road, Bhowanipur, Calcutta.

TRADE ENQUIRIES

(To communicate with any party write to him direct with name and address given below meantioning Industry.)

2400 Jasuja Bros., Partap Street, Amritsar —Want to be introduced to egg dealers and poultry farms of Calcutta.

2441 The Gem Palace, Chomu, Jaipur—Wants to be put in touch with the suppliers of rough blood stones, lapislazuli stones, red or blue corundum crystals and rubies, sapphires, garnets and gem stones.

2461 Kancherla Krishna Murthi, Opp. Andhra Paper Mills, Rajahmundry—Wants to be put in touch with the manufacturers or dealers in stainless steel utensils.

2523 Sukumar Ghosh, 12-1-3, Goa Bagan Street, Calcutta 6—Wants services of a man expert in manufacturing lead pencil.

2550 C.M.S. Rangaraja Chetty & Co., 151, Oppanakkana Street, Coimbatore—Want to be put in touch with the importers of silk thread and artificial silk from Japan to Bombay, Calcutta and Madras.

2565 B.D. Agarwal, 15, Bhawani Dutt Lane, Calcutta 7—Wants to be put in touch with the exporters of Citronella oil from Rangoon, Moulmein, etc. and importers of the same in Calcutta.

2602 P. T. Joseph, 3-810, Mattancherry, Cochin—Wants to be put in touch with the ladies' straw hat manufacturers at Jubbulpore.

2642 Prabhu Singh Champawat, Price Control Clerk, Shergarh, Marwar—Wants to be put in touch with the dealers in peacock feather.

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PLASTIC
MOULDING
MACHINE

EDITOR :

K. N. BANERJEE.

VOL. XLI. CALCUTTA, JANUARY, 1951. No. 490.

COMMERCIAL PIRACY

A NEW menace is in evidence in the field of industries. Bonafide manufacturers who have, by patient researches and wide publicity work, been successful after long years of toil to get their brands established in the market find their position seriously assailed by the advent of innumerable spurious preparations and counter-feits.

A wide range of industries has been affected. Soaps, cosmetics, toilet preparations, medicines, stationery goods, food products including vegetable products and milk preparations are subjects of infringements and imitations. The result is that the consumers can hardly buy to-day any thing of daily use without running the risk of being duped.

The thing is this. While the market of wellknown brands of articles has greatly expanded due to the percolation of Western ideas even into interior villages, the most of the purchasers are not sufficiently educated to distinguish between the real brands and their imitations.

Taking advantage of the situation a number of anti-social elements have entered the market with the sole objective of earning quick profits by unscrupulous and diversified activities at the expense of the above purchasers. They engage agents to procure from the consumers at high rates empty containers of well-known brands and re-sell them in the market after refilling them with spurious preparations under counter-feit labels available in the market.

This is causing substantial harm to the legitimate owners of trade marks and trade names in two ways. First, they suffer a loss of custom and revenue, and secondly their reputation is permanently damaged beyond compensation. The consumer also suffers by the fraud practised upon him in as much as he does not get the full value of the money he has spent. Incalculable harm is thus done to industry and commerce.

Something must therefore be done immediately for the protection of rights of the bonafide traders by strictly dealing with the parties perpetuating the fraud, otherwise the industries cannot survive the sabotage methodically done by unscrupulous pirates escaping the clutches of legal penalisation.

CAUSTIC SODA AND BLEACHING POWDER INDUSTRY

Caustic soda and bleaching powder are manufactured in India at present by six companies making a capital investment of Rs. 2.15 crores. Besides being used considerably in the manufacture of paper, textiles, vegetable products, etc., etc., they serve the country's strategic need. It is therefore disappointing to learn that the alkali group of the heavy chemical industry in India is not faring well and is groaning under the load of foreign competition and has approached the Government of India for help. The difficulties of the industry may be stated to be the following:—First, there is a serious gap between the estimated demand and the rated capacity. As against an estimated demand of 60,000 tons of caustic soda and 15,000 tons of bleaching powder, the actual production in the country was only 6,455 tons of caustic soda and 2,525 tons of bleaching powder. The existing units have got a rated capacity of 10,665 tons of caustic soda, 7,780 tons of bleaching powder, 1,900 tons of bleach liquor, 7,730 tons of hydrochloric acid and 788 tons of zinc chloride. Although production of all these items except beleaching powder, has shown improvement the available equipments are not being utilised to the fullest capacity. There are other factors which undermine the economic production of the finished products. For instance, the transport charge for carrying soda ash, salt, limestone, etc., etc., and electric power charges make up a major portion of the total cost of production. Furthermore the sheer waste of chlorine, a bye-product in the industry greatly reduces the chances of lowering down the cost of production of ca[illegible] soda and bleaching powder.

The industry has therefore forw[illegible]ed to the Government of India its c[illegible] for a very high increase in the exis[illegible] preferential rate of duty, accompanie[illegible] a corresponding rise in the stan[illegible] rate, or in the alternative for the grant [illegible] subsidy of Rs. 5 per cwt. of caustic [illegible] plus a slight increase in the rate of [illegible] existing duty. In regard to bleac[illegible] powder, one section of the ind[illegible] demands for a protective duty of 30 [illegible] cent. on a tariff value of Rs. 20 per [illegible] while another section of the ind[illegible] applies for a total ban on imports.

It would thus appear that the ind[illegible] can only hold out a promising aspect when it can be worked to the rated c[illegible]city, making good use of the byproc[illegible] now going into waste. Moreover o[illegible] two processes employed in the ind[illegible] viz.; causticising process and the ele[illegible]lytic process, the former method has [illegible] found to be uneconomical and hen[illegible] should be discarded. The rai[illegible] authorities may also be prevailed up[illegible] introduce the lowest telescopic rates f[illegible] industry. But it is doubtful if unde[illegible] present financial condition, the Go[illegible]ment of India can grant substantial [illegible]sidy to the industry or impose ba[illegible] imports. We however hope that [illegible] Indian Tariff Board will examine the [illegible] of protection of the industry and [illegible] recommendation so that the industry [illegible] be put on a sound footing in the interest of the country.

MARINE ENGINEERING INSTITUTE

With the declaration by the Go[illegible]ment of India of their policy of rese[illegible]

the country's coastal trade for Indian shipping in August last, the tonnage of foreign shipping on the Indian Coast has considerably decreased. While the Indian ships carried 53 per cent. of the total coastal trade in 1948, these claimed 62 per cent of the trade in 1949 and 76 per cent. so far this year. India-owned tonnage also stands now at 350,000 tons which is considered by authoritative circles as an adequate base for meeting the present requirements of the coastal trade.

With the development of Indian shipping the necessity arises of training men who can man the ships, make and repair them and attend to the duties regarding maintenance of the harbours and piloting them. The want of a Marine Engineering Institute is thus keenly felt in West Bengal which possesses the finest port in India where a large number of international and inland vessels touch for loading and unloading. There are already in existence colleges for training in civil, mechanical, electrical and even aeronautical engineering but up-to-date no efforts have been made for the training of students in marine engineering which offers good scope for useful employment in the navigational line. It is therefore encouraging to learn that the establishment of a Marine Engineering Institute in West Bengal is being seriously considered. The aim should be to give the students such a combination of technical, scientific and professional training as would fit them for the nautical line. It is understood that the Government of India has offered high priority to the requirements of the Institute and a Committee of Experts has been appointed to devise, the syllabus of study, etc.

INDUSTRIAL DEVELOPMENT COMMITTEE

That the price of the industrial products is gradually going up in spite of all efforts to curb it will be seen from the ascending index number of commodity prices. It is an outstanding problem that exercises the best brain of the country. It was previously believed that the prices would go down automatically after the termination of the war. But the war is long at an end, and yet the signs of any reduction of prices of commodities are not discernable. In fact it is now further than in the war-period. The patience of the country has been tried to the extreme. All the efforts of the Government to force a downward trend have proved abortive.

Yet it is being apprehended everywhere that unless the prices come down, the disorderly forces may be set up in the country. It is time that all the factors involving production and distribution be scrutinised carefully to find out the real sources of the incidence of high prices and to devise measures so that the country may have at long last a taste of price-fall. The appointment of a high-level Industrial Development Committee just announced by the Government of India, is therefore not a day too soon. The Committee's functions will be to review the working industries and suggest measures to secure full and efficient utilization of their installed capacity, including the fixation of targets, where necessary, and to advise on the reduction of production costs to a reasonable level while ensuring conditions in which workers can put forth their best efforts. The Committee will also be expected to suggest measures to improve or increase the productive capacity of industries, to advise on special problems such as treatment of uneconomic units and on the future of the development of industries including planning and nationalisation.

A Textile Development Committee will in like manner be appointed shortly to assist in the preparation of a plan for

the cotton textile industry and in devising measures for its effective implementation.

AIR TRANSPORT INDUSTRY

The air transport industry finds itself landed in great financial plight. The Air Transport Enquiry Committee which was set up in February 1950 with Hon'ble Mr. Justice G. S. Rajadhyaksha, Judge, Bombay High Court as Chairman, submitted its report to the Government of India in September last. The Committe think that the financial breakdown of the industry is due mainly to the fact that there are too many operators for the work to be done, resulting in multiplication of overheads, increased costs, wasteful competition and reduced revenues. The difficulties of the companies are also largely due to their equipping themselves with aircraft and spares and recruiting personnel on a scale far in excess of what was needed for the operation of the services which they could reasonably be expected to be allotted to them. Heavy cost of aviation fuel also contributes substantially to the high cost of operation in India. There has been of late a tendency to reduce fares, particularly after the introduction of the night air-mail services, but still the operating costs continue to be high and the revenues of the companies have tended to go down.

The Committee recommends a reduction in the number of air transport operators and operating costs, restriction on the disposal of profits and fixation of passenger fares so as to give a 10 per cent. return on fixed assets. The Committee considers that the present system of assistance by which the operating companies are given rebate of customs duty on aviation fuel consumed by them to the extent of 9 annas per gallon is not satisfactory, as it does not take into account the reasonable needs of each company, but gives assistance depending merely upon the amount of aviation fuel consumed. The Committee has recommended that the break-even need of each company should first be worked out on the basis of its reasonable costs of operation and reasonable estimate of potential revenue. Over and above this break-even need, the company should be allowed a small margin of profit at the rate of 3 per cent. on fixed capital assets; this after providing for income-tax amounting to about 3¼ per cent and a reserve of 1¼ per cent would leave not more than 3½ per cent to the company for distribution to share-holders as dividend.

The Committee has examined the question of State ownership and operation of air services and has detailed the pros and cons of such operation. While it is of the view that the operation of the air transport services in India by a unified state organization would in theory have significant advantages, from the practical point of view, the Committee considers that there is no justification for changing the present position under which air services are being operated by private operating companies. The Committee expects that after its reorganisation scheme comes into operation and with a certain amount of flexibility allowed to the operating companies in the working of their services, Government will not be saddled with any serious liability for the payment of subsidy.

In the event, however, of Government deciding as a matter of policy upon State ownership of air transport services, it is desirable that their operation should be entrusted to a Statutory Corporation, the capital required for the purpose being provided by the Government. The Corporation should however work on purely

commercial lines and be given complete autonomy and freedom from Departmental control except in regard to the main policies to be followed as laid down by the Government.

6-YEAR DEVELOPMENT PLAN OF INDIA

Reference was made in an earlier issue of INDUSTRY of the 6-year Development Plan of India being framed for submission before the Commonwealth Consultative Committee in London. Further details of the scheme are now available and are included in the Report, just published of the Colombo Plan for Co-operative Economic Development in South and South East Asia. The Report gives details of the problem that India had to face on account of the war and subsequently after partition, when a part of which had previously been internal trade in cotton, jute and food grains become a feature of external trade. The schemes of India are designed to improve the standard of living, to provide a minimum of social service and to supply sufficient capital and consumer goods to restrain inflation. To achieve these objectives it is proposed:—

(a) to undertake certain basic public developments such as irrigation and rural electrification in order to increase agricultural production.

(b) to increase the supply of fertilisers, agricultural implements and building materials at a reasonable cost in order to raise the yield of land under cultivation;

(c) to develop and improve transport facilities;

(d) to promote the full use of existing industrial equipment and capacity and to extend the production of iron and steel; and

(e) to encourage industry in the villages in order to provide work for the under-employed and unemployed rural population.

The details of the approved programme relate to agriculture, industries, food, irrigation, etc., etc.

Agricultural programme includes three multipurpose projects which are accorded very high priority. These are the Damodar Valley (Rs. 50 crores), the Hirakund (Rs. 30 crores) and the Bhakra Nangal (Rs. 76 crores). Another major items on the agricultural development programme is the Integrated Crop Production Plan, launched by the Government of India. Increased production of crops at the end of 1956-57 as a result of the schemes approved will be 3 million tons of food grains, 195,000 tons of cotton, 375,000 tons of jute and 500,000 tons of oilseeds.

Under transport and communications, construction and restoration of track, bridges, structural work and rolling stock are included. The scheme for establishment of a plant for the manufacture of locomotives is also being promoted.

In the industrial sector the emphasis is laid on raising the production of steel, particularly through modernization and expansion of existing steel plant and construction of additional capacity for an annual output of 500,000 tons.

The report anticipates the following results in 1956-57 on successful implementation of the programme. Thirteen million more acres of land under cultivation (increase of 3½ per cent); 6 million more tons of food grains (increase of 10 per cent), 13 million more acres of land under irrigation (increase of 17 per cent); 1.1 million more kwts of electric generating capacity (increase of 67%); the availability of cloth per individual will be 15 yards as against 10 yards at present and 16 oz. of food ration in urban

areas as against 12 oz. at present. Foreign exchange expenditure on food supplies which is an important cause of the current balance of payment deficit should also be reduced and substantial increase in exports of raw materials such as oilseeds and short staple cotton and of manufacturers like jute products, cotton textiles and other consumer goods should accrue. At the end of the Six-year period, it is expected that equilibrium will be achieved at a higher level of international trade.

The Report gives the views of the Government of India in case external finance to the extent necessary is not forthcoming for the development programmes. In that event, India would have to face at the same time the problem of counteracting inflation and the necessity of carrying out a modicum of development within the resources at its command. This would inevitably entail a drastic curtailment of imports and possibly the abandonment of some development projects already under way. It might also require, apart from any possible economy in expenditure. the raising of taxes to levels which are bound to cause further hardship. It becomes necessary to resort to a certain amount of deficit financing to carry out a minimum programme of development the existing fiscal and financial controls would have to be intensified and expanded.

NATIONAL METALLURGICAL LABORATORY OF INDIA

The National Metallurgical Laboratory opened on the 26th November, is the fifth in the chain of national laboratories that have been set up in India. The Laboratory has been located at Jamshedpur which is the centre of metallurgical industry in India and will cover in general various aspects of metallurgical research, both fundamental and applied, and will carry out research on ores, minerals, and refractories as applied to metallurgy. The preparation of minerals and ores and the smelting of the latter are so definitely a part of the country's metallurgical industries that facilities for mineral research will be provided at the laboratory. As the metallurgical industry is one of the biggest consumers of refractories, research on this subject has also been included with that of metallurgy, and the work on metallurgical furnace design will also be undertaken.

The laboratory is meant to function as an up-to-date research centre where knowledge of metallurgy, physics, chemistry, engineering, etc., will be utilized to undertake both fundamental and applied metallurgical research. In consequence provisions have been made for statistical studies, chemical analysis, metallography, physical chemistry, heat treatment of metals and alloys, processing, electro-deposition, corrosion, and surface treatment of metals, research on refractories, etc. etc.. Facilities are also provided for the application of research results to commercial operating conditions, and for the study of such conditions as they affect the quality of the products and the efficiency and economy of commercial production. The laboratory is also meant to function as a clearing house for information. It would also advise on the preparation of specifications for Indian conditions and would carry out standard tests whereby the quality of manufactured products could easily be tested.

—COTTAGE INDUSTRIES.

THE COIR INDUSTRY

THE coir industry is one of the most important industries of South India but its immense possibilities in coastal regions is not to be overlooked as these places are already growing the coconut palm in bigger quantities. This industry can be started both as a cottage industry and a large scale factory industry. As a cottage industry it will provide livelihood to a large number of people living in the coastal areas. The preparation of the fibre and the spinning of the fibre into yarn afford a never-failing occupation to the poorer classes of people.

The industry of coir manufacture may be divided into following sections:—

1. Collection of husks.
2. The process of retting.
3. Conversion into fibre and spinning into coir yarns.
4. Weaving of brush mats, mattings. etc.

SELECTION OF NUTS

The selection of nuts is an important point relating to the quality of the fibre. To produce a fibre of a pure hue, it is essential that fully matured coconuts should be selected. This stage arrives only when the nuts remain on the tree for about 10 months. If cut too young, the fibre is weak. If cut later, the quality deteriorates, and as the ripening goes on it gets exceedingly liquefied and so brown and brittle that its value decreases to a large extent. So completely dried and immature nuts are of no use and should not be mixed with those selected for the extraction of fibre.

REMOVAL OF HUSKS

After the selection of nuts the husks covering them may be removed within two days after plucking. In this operation a sharp pointed spike of metal or hard wood is fixed firmly in the ground and the husks are peeled off by striking the nuts against the sharp edge. The husk readily separates and is divided into 3 or 4 pieces. Iron or steel spikers may be avoided for this purpose because they make the fibre black. They should not be left on the ground and exposed to sun, rain, or dew, as these also destroy the colour but should be put to the soaking pits within two or three days after husking.

SOAKING PITS

Since the whole of the secret of the superiority of the Cochin fibre is confined to the above process, the some care might be paid to obtain good fibres. The pits for soaking are best which are situated near the borders of backwaters, creeks, or the mouths of rivers adjoining the sea. The soil should be clean of clay. They should be dug out of such dimensions as to allow 3000 to 5000 husks to be immersed in them at one time. Usually, 1000 nuts require 200 to 300 cubic feet for total immersion, and the depth should not exceed 3 to 5 feet.

SOAKING:—The husks, as soon as they are gathered near the pits should be thrown into them, filled up a little below the level of the ground and should be covered with coconut leaves. Before the water is let into the pits, the husks should be weighted with planks and heavy stones in order that they may be retained in their place when the tide flows, while at the same time they remain sunk below the surface of the water. In some places, the husks are packed in meshed nuts and tied to a post driven on the bank. In certain places, the husks are placed in an enclosure fenced with cadjan pikes. In this position they should be left to decompose from 8 to 9 months

and kept stirred at frequent intervals in this period to help speedy fermentation.

When the husks have been rendered sufficiently soft they should be removed from the pits, washed and well squeezed in cold water to get rid of the mud and noxious smell.

EXTRACTION:—The husks are then placed on stone or wood blocks and beaten with wooden mallets until the soft inner fibres are completely detached from the harsh and thick fibres adhering to the outer skin. These stiff bristly fibres are not suitable for producing yarns for weaving matting. The pitty matter is shaken out and the whole mass is washed again in cold water.

DRYING:—After washing the cleaned fibre is spread on the ground and, with the help of a fine stick, they are whipped to free entanglement. Then they are thoroughly dried in the sun.

WILLOWING:—The dried fibres are further cleaned by the help of a hand-driven willowing machine to get rid of small particles of pitch, knots and hard bits which may still adhere to the fibre. The willow machine consists of a drum in which an iron shaft is made to revolve carrying a number of blades fitted spirally on its axis. The fibres are fed at one extremity of the machine and the shaft is rotated at a high speed. The blades take up the fibres between them and, as they pass through a grid on the upper part of the machine, they scrape off the pithy particles. Moreover, the fibres are straightened and rendered soft by this treatment. Afterwards they are passed on to the spinners.

SPINNING

The willowed fibres are now ready for spinning into yarns suitable for mattings, mats or ropes. The spinning is done either by the hand or by the spinning wheel. The usual method of spinning by hand is to roll the fibre into short lengths of one-foot sliver, twisting in the clockwise direction. These slivers are next twisted together in the opposite direction to the previous twist and the other slivers are prepared and added as reqired, while the spun yarn is held in position by the toes. It is found that the hard spun yarns are stronger than those made with the spinning wheel; and owing to their greater regularity in thickness and uniformity of twist they are largely used in the making of door mats. About 4 to 5 lbs. of yarn can be spun by hand in a day working 8 hours. Owing to the presence of tannin and harshness of the fibres the constant handling of the fibres is not possible as they irritate the skin of the palm.

SPINNING BY MEANS OF SPINNING WHEEL

In spinning by machine two frames are required. One of which contains two spindles and is fixed to the ground; the other contains one spindle and is mounted on wheels. The operator takes a bunch of fibre under the armpit, stands in front of the stationary wheel and delivers the fibre to form the requisite thickness of yarn, whilst the wheel is revolved by another man to impart twist to the loose strand. When a length of about 50 feet is produced, the tail end is hooked to the spindle attached to the movable wheel. Another strand is prepared likewise, and its tail end is also hooked on to the same spindle on the movable wheel. The rotation of the stationary wheel now stops. The movable wheel is put in motion in a direction opposite to the twists in the strands and these are firmly cabled together. A three-sided block of wood grooved on the sides is introduced between strands to regulate the counter twist, prevent entanglement and secure the two strands very close.

The yarns after being spun are then 'ted out into grades according to their ckness, colour and twist. They should spliced and wound into reels before ng sent to the market or weavers.

TREATMENT OF YARNS BEFORE WEAVING

The yarns as received from the manu- :turers or from the market are treated :h a dilute solution of sulphuric acid. is improves the shade and makes them newhat bright. The solution usually ployed is 5 per cent. solution of sul- uric acid prepared by mixing 5 parts weight of sulphuric acid to 100 parts water. The yarn is immersed in this ution for 10 to 20 minutes depending the quality of the yarn. The same ution can be used repeatedly for dipp- of fresh material replenishing the ution from time to time. The yarn after noval from the acid solution is thorouh- washed in clean water and dried in the but not in the direct sun.

After this the yarns are to be sorted :ording to lots of different grades hav- regard to the difference in tints. Then hanks of the yarn are pulled out and iced together so that they may m into one continuous length. This)cess facilitates the subsequent process balling, which not only makes weaving re convenient but also effectively pro- es against avoidable wastage.

The next stage is beaming which con- ts in the winding of the yarn of a con- uous length on a central support of n or wood known as beam. The :n of shorter lengths are not suitable immediate beaming but these are made p spools of greater lengths and then und up in a beam.

Spooling is done by putting the hanks a revolving frame which helps the nding up of yarns around the cylinder as the yarn is brought out by the pull caused by the continuously revolving spool. These spools are then fitted on a frame known as creel, situated at the back of the beam and are wound on the drum according to the lengths required.

The winding on the drum being complete, the strands are drawn through a reed which keeping the yarns separate guides the width of the beam.

WEAVING TOOLS

The tools necessary for weaving are: loom, heald, reed, rod, shuttle, brush cutting knife, shears, treadles, pulleys, etc.

WEAVING

Now comes the actual proces of weaving the different varieties of mats and mattings.

The first process in brush mat weaving is to fit up the chain on the loom. The chain beam is fitted in the grooves of the frame placed at the back of the loom. The yarns are pulled over the back beam drawn alternately through pair of healds and then through the dents of the reed, there being one yarn in each dent and are finally tied to a rod which is connected to the take-up-roller by means of ropes. Healds are tied at the top by means of pulleys and at the bottom to the treadles. By the degression of these treadles the shed is obtained. Before starting the brush work a few binding picks are inserted one in each shade alternately. The weaving now begins. The topping yarns as required by the quality is drawn from the left to right through the shed and then wound on the rod which is placed over the chain strands. Each round of topping is with each straw of the warp round the rod. After the winding is over, a pick of weft is inserted. A slight beating is then effected by means of the reed. Then the brush matting loops are cut through the groove in the rod by means

of the cutting-knife. The winding of the topping yarn takes place alternately with the alternate set of warp strands. The required length being thus woven a few binding picks are now inserted.

In this both the pedals are working alternately, i.e., "A" lift "B" down and so on.

FIRST ROW OF WINDING TOPPING YARN:—There will be no winding with the 1st strand of the 1st heald as it is left for side binding. The first winding will be with the 1st strand of the 2nd heald and the rest with the strands of the 1st heald.

SECOND ROW OF WINDING TOPPING YARN:—This will be with the strands of the 2nd heald excluding the strand on the extreme right which will be with the last strand of the 1st heald. Here also the last strand of the 2nd heald is left for binding.

COIR MATTING

The quality of matting largely depends on the scorage of the yarn. It has already been explained that the yarns are sorted according to different scorages and also shades. Plain mattings generally require yarns of even shades so as to avoid streakiness in the finished products. In fancy mattings however, streakiness is allowed of course to some extent, and yarns of different shades and colours may be employed to a large extent.

After assortment, the same procedure as referred to above namely beaming and spooling has got to be adopted. A further point to be borne in mind regarding beaming is that the loom beam should always be perfectly parallel to the front side of the drum. It should also occupy the central position so far as this loom beam frame and the drum are concerned.

QUILLING

Mattings as woven on the throw shuttle principle, that is, the shuttle carrying the weft yarn is thrown by the weaver through the shed formed by the depr sion of one set of healds. The shuttl thrown from one side by one hand of weaver and caught at the other side the other hand and so on. Matting shu differs in construction from the shuttle, thereby making it necessary the weft yarn to be wound in a conv ent form to fit in the central groove of shuttle. The form in which the we wound is known as quill. To facili the process of quilling the weft yarn first made into spools. These spools then kept in suitable support and strand from the spool is wound on bare spindle of the winding Char Thus when the required size is obtai one quill is removed simply by pulling and the next one started and so the cess continues.

WEAVING OF TWO TREADLE MATTING

In order to make it convenient for weaver, these mattings are heal through 4 healds as shown in the illus tion. The healds are then so arran that they may be most conveniently w ed as 2 healds. In order to do so, he 3 and 4 are tied together to work as 2nd heald. Healds 1 and 2 are simil tied to work as the 1st heald. This is with a view to keep the chain strands apart from one another making it eas depress the heald. After healding, strands are drawn through the reed t being three strands in each dent. number of dents in the reed per depends on the scorage of the mattin be made.

(The number of dents per is the scorage of the matting m plied by 20/3. The number strands for 4/4 matting is the sco multiplied by 20. For example, in case of a 15 score matting, the numb the dents of the reed is 15 × 20/3 e

to 100; that of the strands for a 4/4 roll is 15 × 20 equal to 300).

FANCY MAT

In the manufacture of fancy mats two chains are required. One tight and the other slack. 50 per cent. of the tight chain is the working chain and the rest is the binding chain. After each row of fibre insertion, there are two binding picks or fillings. In this case, three healds are required. The two front healds are for the tight and the back one is for the slack chain. The reed for this quality of mats contains 42 dents per foot having drawn two strands in a dent, the one, slack and the other, tight.

TREADLING.—Before starting fibre insertion a few binding picks are resuired which form the sides in the finished mat. The same number of picks are also required at the finish.

The working of the treadles are as follows:—

1st. pick   1st. & 2nd. healds down.
2nd. pick   3rd. heald down.

and so on for the binding picks, as well as for picks after each row of insertion.

FIBRE INSERTION.—Only on all the strands of the 1st. heald excluding the two side tufts which are inserted on the 2nd. heald.

Rows per foot are 22 }
Takes per foot are 21 } in this quality.

FINISHING

The mats, after being combed out are cut into squares of usual sizes and the sides are tied with jute twine. A band is stitched around the four sides of each mat. The mats are then properly dried. They are next taken to the shearing and trimming machine to be shorn and trimmed. The mats now become ready for packing.

It may be noted, that mats of poor colour have got to be smoked before packing.

JELLY MAKING

JELLY is the product which results from cooking a proper fruit juice with sugar to such a point of concentration that it congeals or sets upon cooling. The texture of jelly is ultramicroscopic. Jelly is free from precipitates and suspended matter. Its consistency should be such that it is tender, easily cut, leaving clear, shining faces and sharp angles. It should spread easily, retain its shape when removed from the glass and should quiver when disturbed. The taste should be sub-acid to tart with a flavour characteristic of the fruit.

JELLY MAKING OPERATIONS

Jelly making consists of two distinct operations: (1) Extracting the juice from the fruit, and (2) converting the juice into jelly.

ESSENTIAL MATERIALS

A proper fruit juice is one that contains at least the minimum amounts of pectin and acid. These together with sugar, are the essential materials in securing the jelly consistency. A lack of any one of these will result in failure. The other essential materials are colour and flavour.

PECTIN

Pectin is the actual jellying substance. It is present in the cell walls of the fruit. Heated in the presence of acid it slowly hydrolises into pectic acid. The function of pectin in jelly making is to hold the sugar, other solids and a portion of water in a sort of clot or net. If the sugar is in excess naturally the clot is distended and thereby weakened and the jelly will be soft or syrupy. But if the amount of sugar is too small the clot becomes more dense and the jelly is tough or rubber-like. There is then a reciprocal balance between the sugar and the pectin

ACID

Acid is found in most fruits in sufficient quantity for jelly making. The more common acids are malic acid in apples, citric acid in oranges, lemons, grape fruits and currants; tartaric acid in grapes, and benzoic acid in cranberries. All these acids may be utilized by the jelly maker.

CHOICE OF FRUIT

A good jelly fruit contains a sufficient amount of both pectin and acid. Fruits which lack either of these will yield jelly only when the juice is combined with a fruit juice especially rich in that particular substance, or by adding the material itself. Every fruit from which jelly is commonly made contains sufficient pectin to produce good jellies when fully ripe. Unripe fruits lack this and no jelly can be made with the natural aroma and flavours of fruits. Ripe fruits have developed their characteristic taste and flavour and they are not only more economical to use for jelly but they will also produce jellies of highest quality. Over-ripe fruits are unsuited to jelly making because as the fruits continue to ripen and become mellow or soft the pectin, begins to break down. Such fruits may be used only in combination with other fruits rich in both pectin and acid, or by addition of pectin solution.

Fruits, which are commonly used in making jellies, are guava, apples (except sweet varieties), orange, plums, grapes, figs, raspberries, strawberries, etc.

EXTRACTION OF JUICE

Fruits contain in their pulp, juice and skins, the acids, pectin, sugar, flavour, aroma, and colour which the jelly maker desires. The maximum amount of the above substances is obtained by cooking the fruit in water. Since most fruits yield only about one-half their jelly making materials in a single cooking, it is becoming a general practice in U.S.A. to make two cookings of practically all fruits in order to realize the greater jelly value from them.

COOKING THE FRUIT

The fundamental things to be accomplished in cooking the fruit are a softening or breaking down of the tissues to set free the materials desired and a rapid solution of them in the hot water and fruit juice. It is not necessary to cook the fruit to a fine pulp but only until thoroughly tender and partially broken up. The length of the cooking period varies according to character of the fruit. Soft fruits will require 5 to 10 minutes, whereas hard fruits as apples, 15 to 20 minutes. Excessive cooking is to be avoided since it does not effect additional solution of jelly materials and it does tend to break down the pectin.

RATE OF COOKING

The cooking should proceed at a slow to moderate boiling in a covered vessel. The cover will insure uniform cooking of all the fruit and it also prevents excessive loss of water due to evaporation. A short standing period after cooking is highly desirable with coloured fruits since more of the colour bodies are set free and the finished jellies will be of best colour.

RATIO OF WATER TO FRUIT

The amount of water added to the fruit when extracting jelly stock together with the length of cooking will influence in a large measure the amount of jelly making materials obtained from the fruit and this in turn will determine the yield and quality of the jelly. As a general rule 1 pint of water for each pound of hard fruits, such as apples, crabapples, and plums and 1 pint of water for each quart (approximately 1¼ pounds) of soft fruits such as berries and currants give most

satisfactory results. All fruits are given two cooking or extraction processes, with the above ratio of water added for each cooking.

STRAINING THE JUICE

In straining the juice from the pulps a single layer of good grade cheesecloth should be used. The cloth is spread over the vessel that is to receive the juice. The hot juice and pulps are poured into it and the ends of the cloth are gathered up in the hands in such a way as to form a hammock. By alternately lifting and lowering one of the hands, the pulps may be moved from one part of the hammock to another, straining out the free-run quickly. After the final cooking has been made the pulps are subjected to pressure in order to obtain all the juice.

CLARIFYING THE JUICE

The juice obained by pressing is mixed with the two extracts and the entire lot is clarified by allowing the juice to flow through four layers of cheesecloth. This is most easily done by placing a colander or sieve over a suitable kettle and spreading the folded cheesecloth over the colander. The cheese cloth must not be pressed because fine particles of pulp would be forced through and the juice would be unfit for best quality jelly. Most juices are much more easily clarified if they are hot. The normal yield of clarified juice is approximately 1 quart for each pound of fruit.

BASIS FOR SUGAR RATIO

The clarified juice has long been the basis for estimating the amount of concentration and also the ratio of sugar to be added. It is, however, a better practice to substitute a given quantity of fruit for a measured amount of clarified juice for this basis, since by doing so more uniform jellies may be made. The pound of fruit whereas the amount of juice obtained from a pound of fruit may be quite variable. It is safe, then, to assume—that the amount of jelly making materials obtained from a pound of fruit, over a large number of trials, will be fairly constant. The yield of juice, however, may vary from 24 to 36 ounces per pound of fruit. But this difference is practically always due to a slight difference in rate of cooking, length of cooking period, or to type of equipment. The yield of 24 ounces of juice indicates therefore only a more concentrated juice which contains approximately the same amount of jelly making materials as does the 36 ounces. This being true it naturally follows that each of these two lots of juice should receive the same amounts of sugar if the resulting jellies are to be uniform in taste and flavour.

CONVERTING THE JUICE INTO JELLY

The first step in converting the juice into jelly is concentration by rapid boiling. The amount of concentration is determined by (1) the yield of juice per pound of fruit, and (2) the ratio of sugar that is to be added. Experience has shown that the colour, consistency, and flavour of jellies is best when the cooking period, after the sugar is added, is relatively a short one. And because jelly forms when the sugar concentration approximates 66 per cent. of the finished jelly the concentration of the juice is a very important part in the operaion. Because the composition of juices varies somewhat it is not possible to state just when the process of concentration, is the ideal time for adding the sugar, but for the amounts of sugar recommended good results will be obtained if the juice is concentrated approximately one-half before adding the sugar.

CONCENTRATION OF JUICE

of fruit juice or per pound of fruit is not a fixed quantity. It may vary within rather wide limits. The chief factors which determine the ratio of sugar are (1) the acidity of the fruit, (2) the taste of the consumer. Highest quality jellies are those which have a pleasant sub-acid taste and the aim of the jelly maker should be to so ratio the sugar and fruit that the finished jelly will have that desirable sub-acid taste and a distinctive fruit flavour.

A good general rule is to keep the ratio somewhere between one-fourth to two-third the amount of extracted juice.

THE JELLY TEST

Many tests to determine the finish point of jelly are advocated. However, only two are here recommended. (1) The spoon test is quickly made and with a little experience is reliable. Testing should begin shortly after the sugar is added, but not until the juice has boiled up well in the kettle. It should be repeated at short intervals until the test has been shown at least two or three times. It is made as follows:—The spoon, preferably a metal one with smooth, clean edges, is lifted full from the boiling syrup and held about a foot above the kettle. As the contents are poured back into the kettle the behaviour of the last portion of the juice will indicate the condition of the syrup. At first it may pour like water, the final drops forming one tiny stream. Later two streams or drops will appear. As the cooking continues these last two or more drops will flatten out into a thin sheet which as the jelly reaches the finishing point will shear away from the edge of the spoon, leaving it clean. This shearing away of the sheet from the edge of the spoon is known as the sheet test or spoon test for jelly. (2) If a thermometer having a fixed scale is placed in the kettle of boiling syrup after the sugar is added it will show a continually rising temperature. At the same time if the spoon test is applied the temperature of the finished jelly can be noted. This temperature will vary with different fruits and with different ratios of sugar. The range is 219.5°F. to about 223°F. at or near sea level. Once the temperature of a finished jelly has been determined it may be used as the finish point of all subsequent jelly made from that fruit.

POURING THE JELL

No time must be lost after the jelly test has been obtained. The boiling-hot jelly is poured through a single layer of cheesecloth which has previously been spread over a suitable utensil. The edge of the cloth are gathered up and the cloth lifted so that the jelly may quickly flow through. This straining is to remove any scales of scum which may have become loosened from the sides of the kettle. The jelly is then quickly transferred to the glasses which should be clean and dry and which stand on wood or on a cloth.

The glasses should be filled to within ¼ inch of the top. After standing for some minutes any bubbles that form on the surface of the glasses may be removed with a small spoon. The jelly should remain undisturbed until it has set.

THE PARAFFIN CAP

As soon as the jelly has set, it should be paraffined, sealed and stored in a cool, dry place. A teapot makes a handy utensil for melting and pouring paraffin. This should be hot and only just enough to cover the jelly should be poured into each glass. When the paraffin has cooled the metal caps are applied and the jelly is stored.

DEFECTS IN JELLY

Defects in jelly may arise from mistakes. The following are the most com-

mon defects which should be carefully continued to ensure good product.

FAILURE OF JELLIES TO SET

This is due to any of the following causes:—

1. Poor juice, that is, juice lacking in acid or pectin or both.
2. Too large a ratio of sugar.
3. Not cooked to the finish point or cooked beyond the finish point.
4. Long slow cooking.

CLOUDY JELLIES

1. Juice not properly clarified before making into jelly.
2. Improper manipulation.
3. Pouring into glasses after congealing.
4. Use of immature fruits or excess of pectin.

SUGAR CRYSTALS

These appear due to lack of thorough stirring or too much has been added or jelly has been made too much concentrated.

WEEPING JELLY GLASSES

This is the separation of a quantity of liquid in storage. The reason for the separation of the liquid is related to the too much acidity of the juice which is made from the more acid fruits.

FERMENTED JELLIES

This may arise when the jelly is not concentrated to 65°Be. To remove this defect add more sugar, heat to 221°F and pasteurise in sealed jars.

RECIPES

We give below a few recipes of interest:—

GUAVA JELLY

Wash guavas, and slice into small pieces with a sharp knife. For each pound of fruit add 2 pints of water and boil until soft (about 25 minutes), allow to stand until cold. Pour into strong cloth bag and allow to drain pressing to extract all juice. This juice is then drained without pressing through a clean fine cloth.

Now bring the juice to a boil, and then add the sugar. Continue boiling until the jelly point has been reached, which is indicated by the flaking or sheeting from the spoon. The jelly point of the guava is 108°C or 226.5°F.

ORANGE JELLY

Take 4 dozen bitter oranges, 2 dozen sweet oranges, cut the fruit in pieces. Take out the pips. Keep out half the orange peel. Cover with water. Stir till tender enough to go through a jelly bag. Add the juice of 8 lemons to the juice now filtered. Heat for half an hour. Add 1 lb. sugar to every pint of this juice. Heat till it jills. Do not stir.

JELLY OF TOMATO WITH APPLES

Tomatoes	8 lbs.
Sour Apples	4 „
Refined sugar	3 „
Lemon juice	5 oz.

Wash sour apples and tomatoes, cut them into thin slices and cook them to extract pectin without any addition of water. Strain the juice through a fine sieve and add sugar. Boil the mass till a temperature of 222°F is reached. Add lemon juice before the final temperature is reached. Remove it from the fire and bottle the jelly.

GRAPE JELLY

Use firm ripe grapes. Add 1 pint of water for every 2 pounds of fruit. Remove stems, green, and decayed fruits. Boil slowly for 10 minutes. Strain the juice. Return pulp to kettle, cover with water, and cook slowly for 10 more minutes. Strain juice. Combine the two extractions and concentrate the juice so that 1 quart is the equivalent of 2 pounds

of fruit. Use 1½ pounds of sugar for each quart of juice. Over-ripe grapes may be used if apple jelly stock is used measure for measure. In this 2 pounds of sugar for each quart of mixed fruit juice will make a satisfactory jelly.

MEDICATED SOAPS

MEDICATED soap is one in which a medicament is combined with soap in order to give medicinal properties to the finished soaps. These soaps may be made as liquid soaps, paste soaps, milled soaps or cold process soaps. By far the largest number appears as milled soaps because it is more convenient to incorporate the medicaments. There is no particular difficulty in making the soap base, and it is customary to use tallow soap chips for medicated milled soaps. In the case of liquid soaps, the ordinary coconut oil liquid soap is used. For paste soaps, bases on the order of shaving cream which are superfatted land themselves well to the addition of medicinal ingredients. These are, however, quite expensive and paste soap finds only limited use in this field. In merchandising medicated soaps, it has become customary to refer to them by the name of the medicament such as sulphur soap, mercuric iodide soap, carbolic soap, etc.

CARBOLIC SOAP

The term carbolic soap does not necessarily mean that it contains carbolic acid but the soap which contains at least 3 per cent phenol or the higher homologues of phenol calculated as cresol.

By defining a carbolic soap in this manner, it is possible for a soap manufacturer to take advantage of the fact that the higher homologues of phenol like cresols and xylenols are more desirable additions than carbolic acid. These phenols are less poisonous, possess a higher phenol coefficient or disinfectant value, and are more stable in soap than carbolic acid itself. It is for this reason that they are most generally used. The phenols may be added to liquid, solid or cream soaps and impart disinfecting value to the soap when used correctly. It is most satisfactory in the case of a milled soap to add the colouring matter and phenol, with perfume if desired, in the amalgamator, Coldmade soaps and floating soaps are also carbolized. The addition of the phenols has a tendency to soften the soap and for this reason it is desirable to use a higher titre stock for milled or cold-made soaps. Other phenolic products like thymol and resorcinol are also added to soaps but these are not sold in any volume.

RECIPES

I.

Coconut oil	12	oz.
Tallow	3	„
Caustic soda lye 37°Be	8	„
Carbolic acid	2	dr.

Melt the oil and tallow over mild heat and mix thoroughly. Take down from fire. Next slowly mix the caustic lye with stirring. When the mass is appreciably thick mix the carbolic acid after dissolving it in 6 drams of water. Then proceed as stated in the other recipe.

II.

Coconut oil	80	lbs.
Tallow	40	„
Caustic soda lye (38°Be)	60	„
Phenol	3	„

Melt the coconut oil and tallow together by gentle heat. Then raise the temperature of the mixture to 35°C and stir in the caustic soda lye. Continue stirring until the soap becomes sticky.

Now dissolve the phenol in a little water and crutch well into the soap. Perfume the soap if desired with a little clove oil, lavender or rosemary oil. When the soap is hard, cut into tablets and wrap in an airtight package.

III.

About 3 per cent of carbolic acid is added to soap in a melted state, and thoroughly incorporated by crutching. It is then put into a frame, and when cold is cut into squares and moulded.

A typical recipe is as follows:—

White soap	20	lbs.
Starch	1	lb.
Carbolic acid	1	oz.
Oil of lavender	2	"
Oil of clove	1	"

MERCURY SOAPS

Due to the fact that mercury salts possess germicidal powers, it is only natural that they should be used in soaps to add germicidal value. Formerly mercuric chloride or bichloride of mercury was added to soap, but it was soon discovered that this salt, while possessing disinfecting value, is decomposed by the soap base. Bichloride of mercury soaps turn grayish and quickly lose their germicidal value.

The most widely sold mercury soaps on the market are the mercuric iodide soaps which are usually marketed as a blue-coloured milled soap in a flat, square cake. The content of mercuric iodide is either 1 per cent or 5 per cent. They have enjoyed some popularity with the medical profession and are quite extensively used.

To make mercuric iodide soap, it is necessary first to dissolve the red mercuric iodide in a mixture of potassium iodide and water. To do this advantageously, 50 parts of mercuric iodide, 37½ parts of potassium iodide and 25 parts of hot water are most generally used. The potassium iodide is dissolved in the water and the mercuric iodide is then added to this solution. The mass is stirred until dissolved and then strained. This solution of mercuric iodide is added in the amalgamator together with colour and perfume for the manufacture of a milled soap. It may also be used in the crutcher in cold-made soaps.

NEEM SOAP

Coconut oil	5	seers.
Neem oil	1	seer.
Caustic soda (70°-72°)	1	"
Water	2	seers.
Victoria blue	3	mashas.
Uranine yellow	½	masha.

Dissolve the caustic soda in water and allow the solution to cool. Now in another vessel mix the oils and then slowly add the caustic soda lye with continuous stirring. When the whole mixture has acquired the consistency of thick paste the colours are intimately incorporated into it after being finely ground and the creamy substance is subsequently set aside for 48 hours to settle. The soap formed in this manner is next cut into suitable pieces and moulded.

CHAULMOOGRA SOAP

Coconut oil	20	seers.
Castor oil	2	"
Neem oil	1	seer.
Chaulmoogra oil	3	seers.
Caustic soda lye 36°Be	15¼	"
Soda green	2	dr.
Dissolved in boiling water		q.s.
Ichthyol	1	lb.
Thyme oil	4	oz.
Oil citronella	4	"

Fresh and clear oil and clear lye should be taken. The oil should just be in melted state and not hot but the lye

should be cold. Dissolve colour in boiling water but don't boil. Rest of the procedure is as usual.

TAR SOAP

Coconut oil	20	lbs.
Tallow	10	,,
Juniper tar	5	,,
Caustic soda lye 40°Be	15	,,

Proceed as by cold process.

SULPHUR SOAP

Coconut oil	20	parts.
Caustic soda lye 37°Be	10	,,
Sulphur sublimed	3	,,

Melt the coconut oil over mild heat. Take down from heat as soon as the oil is melted. Then mix the sulphur. Now slowly mix the caustic lye with stirring. As soon as the saponification begins the mass gradually thickens with the evolution of heat. Stir slowly otherwise the oil and lye will separate out. As soon as the mass becomes pasty pour into frame. Keep overnight and then cut into blocks and stamp.

BORIC SOAP

Coconut oil	4	parts.
Tallow	2	,,
Caustic soda lye 37°Be	3	,,
Boric acid	2	,,

First of all intimately mix the boric acid in the oil and fat. Then mix the caustic lye as usual.

SMALL VULCANITE ARTICLES

VULCANITE is a mixture of rubber, sulphur and other ingredients, which can be worked in a plastic state and moulded into any shape and vulcanized.

MATERIALS

The necessary materials are rubber, wax, plaster of paris, and some powdered pumice-stone, whiting and rouge for polishing purposes.

TOOLS

The tools required in working out the vulcanite articles are: Pocket knife; Vulcanizing flasks: some pieces of ordinary wire of various thickness; two 1 inch wire nails with heads cut off and inserted in wooden handles; a medium-sized basin; spoon; a flask holder, one hammer; brushes; etc.

APPARATUS

A press, vulcanizer, polishing lathe and a bunsen burner or spirit lamp will also be required. Of these one can do without press and polishing lathe but a vulcanizer is indispensable. The vulcanizer is simply a vessel made of gun metal placed in an iron jacket with a Bunsen burner or spirit lamp underneath. The flask containing the work is inserted into the boiler part, and the cover which fits the top is absolutely steam-tight and is screwed down firmly. Water is placed in the boiler first and then lamp lighted.

The tap in front is to let out in the steam after vulcanizing, but this is screwed tight during use. The mercury is placed in the socket in the cover, and the thermometer then inserted. As the water boils, the steam acquires pressure, and as the temperature rises it is recorded on the thermometer. After about thirty minutes the thermometer should register 300°F. Do not go beyond this point; not that there is danger, but that is the best temperature for ensuring good vulcanizing. Such has been proved by many years experience of working in vulcanite, in spite of the directions on the rubber boxes stating 315°F.

When 300°F is reached turn down the gas so that there is just a dim show; this keeps the temperature steady. Leave for one hour, then turn out the gas, and by gently turning the tap let out steam, not too fast, or the sudden lowering of the

perature may injure the work in the k.

The vulcanizer is tested to at least lbs. per square inch, so it can be lerstood ;that 100 lbs. is quite safe reover, there is a safety plug in the er.

YPE OF SMALL ARTICLES TO MAKE

The following is a list of small articles t can be easily made. Cigarette-hold- rings, club badges, mascots, ink-pots, ch-boxes, statuettes, table-rests, ch-stands, photo pendants, button ver-holders, etc.

Let us now go into detail of a particu- object to illustrate.

CIGARETTE HOLDER

In making a cigarette-holder first of decide on the size the holder is to be: , one 3 inches long. Now take a sheet wax and warm over the flame, then roll ip into the shape of a cigarette-holder.

Warm a wire the necessary size for the oke hole, push into the whole length he holder, and leave it until vulcanized. is wire should project a little at each l. Then at the cigarette end hollow the wax sufficiently to admit the inser- 1 of a cigarette. Also make the neces- y teeth grooves at the other end for ding in the mouth.

PREPARING THE PLASTER

Now take the flask and mix some ster. The proper way to mix the ster is to pour a little water in the in, then spoon into it some plaster; let settle, then when all the plaster is urated pour off the surplus water and thoroughly with the spoon. Never a wet spoon in the plaster bag, or the ster will be spoilt.

Now fill the large half of the flask with ie of the mixed plaster and insert the holder, taking care not to embed it too deeply; about one-third of the holder should be left uncovered. The wire which sticks out at each end should be buried in the plaster to keep it in position.

FILLING THE FLASK

Wait a few minutes until the plaster sets hard. Now trim it up to make it nice and smooth. Take the oil brush and paint a little oil over the plaster surface; this is essential, otherwise the two parts of the flask will stick together. Now mix fresh plaster and run on the top of the hard, also fill the reverse of the flask. When full place the flask together and press down tightly seeing that it goes together properly. Wipe off any surplus plaster that squeezes out, and have this second lot of plaster to set hard.

HEATING THE FLASK

Now put the flask as it is in the sauce-pan, in which there should be a little water, and put over fire; also put on the cover. While waiting for the water to boil and the flask to heat, prepare the rubber. Select the box of rubber and after stripping off the hollands, that is, the linen covering from both sides of the rubber sheets, cut with a pair of scissors into small oblong pieces.

By this time the flask in the sauce-pan has been heated up appreciably. Remove it. Then take the prepared rubber in a plate and place on top of the sauce-pan to warm up.

REMOVING THE WAX

To remove the wax gently open up the flask with a plaster knife. Now take the kettle of boiling water and scald out the wax, by placing the flask on the "flask holder" and pouring the boiling water on the wax, while holding over a basin. When the wax is melted away swab out with cotton-wool held in the squeezers.

The space thus revealed corresponds with the shape of the cigarette-holder, with the wire running through it and held each end by plaster.

PUTTING THE RUBBER

Now take the wire mails inserted in wooden handles and pick up a piece of warm, soft rubber off the plate and press into the cavity in the plaster; continue until full. Then take one piece of linen and wash well in hot water to remove the starch used in its making; then while wet place it over the flask where the packed rubber is. Fit on the other half, and return to the sauce-pan. Leave it in the water for 10 minutes, kept just boiling all the time and with the cover on. Then remove with the cloth again and press, either by means of a vice or heavy weight. After this open up the flask again, and remove the linen. The object of putting this cloth is to prevent the rubber from sticking to the plaster when hot. If the rubber has squeezed out a little all round, then it is about right and ready to vulcanise; but if this is absent, see that a little more rubber is placed in and squeeze up again, open and inspect. There is no need of warming up again for this.

VULCANIZING

Now fasten the two halves of the flask together by means of the side-pins and place in the vulcanizer. See that there is enough water in the boiler—it should be just sufficient to cover the flask—and light the gas underneath. Put on the cover and screw up tight. Then pour sufficient mercury in the socket and insert the thermometer.

Do not turn off the steam tap before steam issues, or else there will be air inside the vulcanizer, and that may cause the cigarette-holder to become porous and not vulcanize properly.

Keep an eye on the boiler, and after about thirty minutes from the time of screwing up the steam tap the thermometer should register 300°F. Turn the gas low and keep it so for an hour. Do not leave the boiler, but watch it now and again to see that the gas is not turned too low, for if so the temperature will go down, and the gas must be turned up a trifle to get the heat up again. On the other hand, should the temperature register beyond 300°F. turn the gas low. A little practice will soon indicate the amount of gas required.

COMPLETING THE VULCANIZATION

When the hour is up, turn out the gas and let the steam out by means of the steam tap. Do not let the steam out too fast, as a sudden lowering of the temperature is inadvisable for good vulcanizing; also never attempt to unscrew the cover before all the steam is out, otherwise serious injury may result, or at least a bad scald. The vulcanizer is quite safe if handled properly.

When all the steam is out remove the thermometer and put it in a safe place, as it is easily broken. Next unscrew the cover, and pour the mercury in its socket into a small jar or bottle, where it should be kept, as it can be used over and over again.

REMOVING THE FLASK

Now remove the flask and put it in a basin of water to cool. After about fifteen minutes the flask may be opened. Knock out the pins at the side of the flask and carefully dig out the cigarette-holder. The plaster, by action of the steam has become soft again and will permit this.

Wash the holder, which will be rough and possess a ridge along its side where the surplus rubber has squeezed out. Wipe dry and then file off any surplus vulcanite. A piece of wood about the width, length and thickness of two match-boxes placed end to end, should be screwed on to the

bench to project over the edge, and is used to rest the work on while filling; this method has a great advantage over filling on or against the flat bench.

FINISHING AND POLISHING

Generally touch up the cigarette-holder with a file and make smooth, finishing with glasspaper. Now light the bunsen burner and slightly warm the wire which protrudes, and with a pair of pliers pull the wire out of the cigarette holder. If the wire sticks tight and requires a certain amount of strength to pull it out, warm the wire and manipulate it, pulling steadily, but at the same time be very careful not to let the vulcanite get in or too near the flame, or the holder will be spoilt.

Now comes the polishing. Place a pumice brush, previously dipped in water, on the lathe, and in the tin dish underneath it place pumice and water.. Keep the treadle going steadily, and apply the pumice and water to the holder; then press, not too hard, against the brush. Keep applying the pumice and water and pressing against the revolving brush, every now and again watching the effect of the first process in polishing, which is to get all the scratches out and form a smooth surface.

When this is done remove the pumice brush, wash well the holder, then fix on a white brush that has soft bristles. Revolve at a faster speed than when pumicing, and use whiting instead of pumice. This will bring up a high polish. A little rouge can be applied as a final polish to give greater lustre. Wash the holder once more, then wipe dry, and the cigarette holder is complete.

MAKING A PIPE-STEM

To make a new pipe-stem to replace a broken one, the same method is employed, only the "cigarette end" must be fitted to the pipe when the job is in the wax and before inserting in the flask. Otherwise it may not fit.

MAKING RINGS, ETC.

To make rings, make a wax band of the required thickness and size around the finger selected. If desired, a shield or heart-shaped piece can be put on one part of the ring. Then when packing in the soft rubber use, say, black rubber for the ring and red for the heart. Or if shied-shape, use several different colours and make it a sort of jazz effect. Black rubber and a gold shield or heart is very handsome in appearance. Gold could be used for the end of the cigarette-holder.

Club badges, mascots, statuettes, all are made by the same method; and whatever colour rubber desired can be used. All that is necessary is to model the subject in wax, and flask and finish in the same way as described for the cigarette-holder.

MANUFACTURE OF CHEWING TOBACCO

THE manufacture of chewing tobacco is one of the profitable cottage industries in this country. Its demand and sale are increasing from day to day as the people are indulged in chewing betels more and more.

The chewing tobacco comprises several varieties of the products, namely zarda, surti, kimam, dokta and sukha. It is proposed to discuss their preparations on a small scale in this article.

INGREDIENTS

The chief ingredient entering into the composition of zarda, surti, kimam, etc. is the tobacco leaves. But not all kinds of tobacco leaves are suitable for these preparations. The following types are generally selected:—

Motihari and jati tobacco of Bengal; ihari, Vilayati and calcarttya of ır; Meenampalayam of Coimbatore; hakkad tobacco of South Kanara; rbi of U. P., N. Tobacum of North st Frontier Province and Kali Chopa- and Judi of Gujerat.

Besides tobacco leaves there are a ıber of spices that go into the compo- ›n of chewing tobacco. These are i not only to increase the volume but ı to make the product more palatable.

These are: Aniseed, cardamom, iander seed, nutmeg, black pepper, 'ron, etc.

The other ingredients are the perfum- materials. These comprises the fol- /ing: Musk (real), musk flora, musk o, musk liquid, musk amburette, rose o, kuda otto, sandal oil, chera, rose ıter, kuda water, etc.

PREPARATION OF SURTI

Surti is a milder form of chewing bacco. It is produced with the finest bacco leaves possessing good flavour. sually Guntur leaves are suitable, for is Surti owes its popularity to its very ·licate aroma which it imparts to the outh.

GENERAL PRINCIPLE

There are many methods of preparing ırti but the following is mainly used:— ıfter selecting good developed tobacco :aves wash them, remove dust from the urface. Then reject the stalks and ribs nd allow to dry in the sun to render the eaves crisp. Then pound into powder nd sift through a fine sieve or muslin. The powder is moistened or soaked in ose or kuda water, the measure of which ıas however been omitted. A quantity ufficient to moisten the tobacco is equired.

Now the spices after being weighed out are baked over moderate fire and separately powdered and sifted. These are then incorporated into the tobacco. The whole mass is then boiled over slow fire to evaporate the liquid until the mass is brought to the consistency of a paste. The paste is then rolled out and pellets are made by hand. Some times the paste is rolled out on a fine sieve and the minute droppings are collected in a tray placed below and then dried in shade. Where pilules are made they may be of the size of black pepper and when granules are made they may be like small sugar grains.

GOLD AND SILVER COATING

To attract public attention and to give a brilliant exterior appearance the pilules are coated with gold and silver leaves. For this purpose a leaf is laid on the surface of a small tray with narrow rims. A number of pilules are put on it and are made to roll on the leaf by rocking the tray.

The leaf being extremely delicate and brittle will break up into fine particles and attach themselves to the pellets. Similar is the case with granules.

Sometimes instead of coating the pilu- les separately, simply dust of the leave is scattered on the pills. Sometimes powder- ed saffron is spread, while packing, on the mass to ensure a variegated effect.

It must be noted that the leaves must be of real gold and silver and not of bronze and zinc, for then the products being edible would be prejudicial to the health of the consumers.

COLOURING

The natural colour of the surti is blackish but a fine reddish colour is im- parted to the surti to attract popular fancy. For the purpose use may be made of edible aniline colours in proper quan-

tities. The most favoured colour is the orange aniline dye which is much in vogue in the preparation of sweetmeats.

Another way of colouring the surti is to treat the preparation with the extract of Pegu catechu. In practice, the catechu is soaked in sufficient quantity of water and a small proportion of lime is added into the decoction. A fine brownish colour develops and this when incorporated into the mass of the surti colours it finely.

ADULTERATION

No adulteration should be made in the interest of public health in the making of the surti. The stalks and ribs should be invariably rejected, otherwise the preparation may give rise to headache and great uneasiness in body and nerves when the dose is slightly in excess.

RECIPES OF SURTI

The following are typical recipes of surti:—

I.

Tobacco	20	tolas.
Kuda water		q.s.
Nutmeg	1	tola.
Cardamom major	1	"
Cardomom minor	1	"
Musk flora	60	drops.
Musk liquid	120	"
Musk amburette	30	grains.

Proceed in the manner as directed under general process.

II.

Tobacco	20	tolas.
Coriander seed	20	"
Aniseed	5	"
Cumin seed black	5	"
Water		q.s.
Musk liquid	60	drops.
Rose otto	30	"
Musk otto	30	"

Take the tobacco leaves after rejecting their stalks and ribs. The leaves and the spices are then baked separately on a moderate fire and then each of these is pounded into fine powder. The powders are then macerated together with water and singed over a moderate fire. Then make into pills of desired size. Then dry in air. Apply the perfume. Now coat some of these pills with silver or gold leaves and leave the remainder without any coating. This will ensure a variegated effect. Finally scatter half a tola of saffron and put in glass jars.

ZARDA

The constituents in the manufacture of zarda are the same as in the case of surti. The underlying principle of manufacture is that the leaves are first of all striped of their stalks and mid-ribs. These are then washed in water to remove foreign particles from their surface. The leaves are next soaked in boiled water to which a small amount of rose or kuda water may be added. The leaves are then brayed and made into a paste. Sometimes a pulpy extract of the moistened leaves is drawn by straining through cloth.

Now to the paste a judicious amount of spices baked and powdered is incorporated. The paste is further warmed to remove the moisture and dried completely. Sometimes a further amount of finely cut tobacco leaf is added. The mass is then broken up into granules. The essential oil is then sprayed over the granules. The finish zarda is finally put in glass jars.

If it is intended to coat the granules with gold or silver leaves the direction given under surti may be followed.

TYPICAL RECIPES

1

Hingli Tobacco	1	sr.
Cumin Seed Black	1	ch.

Aniseed	1 ch.
Coriander seed	1 ,,
Musk	1 tollah.
Water	q. s.

Remove the stalks and ribs of the hingli tobacco and bake over a moderate fire. Then powder the leaves finely. Meanwhile bake the spices and have them also finely powdered separately. Mix these ingredients together and add the musk, previously macerated in water. Then moisten with water and macerate the mass well. Next strain the mass with sufficient water through a clean cloth to get a pulpy extract of the ingredients. Spread the mass over a porcelain dish and dry in the sun to form a cake. Break the cake into granules or quids.

II

Tobacco Leaves	20 tollas.
Aniseed	5 ,,
Coriander seed	10 ,,
Musk otto	1 dram.
Musk amburette	20 grains
Musk liquid	2 drams.
Rose water or kuda water	1 oz.
Water	q. s.

Proceed in the manner as given under general process.

PATI ZARDA

In the preparation of zarda the tobacco leaf is first broken into small pieces and then boiled in lime water along with spices, till the water is evaporated. The particles of tobacco left behind are then dried and coloured with saffron or other vegetable dyes.

Usually beedi tobacco both of good and different quality is taken for making guli zarda. It is pounded not too finely and sifted through a sieve. It is then kneaded well with an adequate quantity of kimam, and the refuse liquid left over after the preparation of zarda. Knead till a sticky mass like the hookah tobacco is obtained. Now dip the mass into a colour solution (black or red as desired) to give it the well known colour. Sometimes the tobacco dust is first of all dipped in the colour solution and then kneaded with kimam. In that case the zarda will be defective in as much as the colour will not be quite well. For glaze dip the preparation into a solution of gum acacia and allow to dry. This also makes the zarda crisp. Finally, add a small quantity of musk and hena as scent. The quantity to be added depends upon the final scent to be imparted to the stuff. Dry in the sun and pass through a sieve. Finer grains are known as guli zarda while the coarser grains are retained for use in pati zarda.

KIMAM

As already mentioned the demand for kimam as a chewing tobacco to be used with betels is steadily increasing. The process of manufacture is simple and the manufacturers of surti can easily take up the kimam business as a side occupation.

The principle underlyng the manufacture of kimam is almost the same as in the case of surti. The only difference to be kept in view is that while surti is to be marked in solid condition, kimam is put on the market in the form of a thick liquid of viscous consistency.

GENERAL PROCESS

Spices and scented waters are liberally used in addition to well-flavoured and thick tobacco leaves. The stalks, mid-ribs and veins of the leaves are first removed and the leaves are soaked and boiled in water to which scented water, like rose-water, kuda water may be added. Spices like saffron, cardamom, aniseed and musk are also added to digest. The pulpy material is then allowed to dry after strain-

ing and removing the remnants of the stalks, mid-ribs, and veins of tobacco leaves. The product then assumes the consistency of a thick and rough paste which is known as kimam.

The chewing tobacco thus prepared is usually blackish in colour, but sometimes vegetable dyes are used to give it a redish.

TYPICAL RECIPE

Tobacco powder	40 tolas.
Cardamom major	2½ ,,
Cardamom minor	2½ ,,
Aniseed	5 ,,
Coriander seed	5 ,,
Rose water	2 ,,
Water	q. s.

Perfumed as desired with liquid musk.

The method of manufacture is the same as described above. Variations of the recipe are quite possible with the incorporation of different flavouring mixtures.

TOMATO PRODUCTS

TOMATO to-day is a part of a universally liked relish. It is rich in body building materials, such as mineral salts like potash and phosphorous and contains an appreciable amounts of Vitamins A, B, and C & K. The Vitamin C in tomato is not destroyed even by cooking as in other fruits.

A number of useful preparations can be done.

TOMATO JUICE

The ripe tomatoes as received from the growers are graded. These are then dumped into running water and washed thoroughly. They are then carefully picked and trimmed, only the best matured tomatoes being selected for juice making.

In the juice plant the specially selected tomatoes are passed through a chopper. The chopped pulp is then heated by means of a tubular heater, from which it is passed to a finisher, where the juice is forced through a very fine mesh cylindrical screen to remove skin, seed and other large pieces of solid matter. The juice then is allowed to flow to surge tanks equipped with small agitators to insure uniformity of the juice. A small quantity of salt is added to the juice in these tanks, usually about 2 pounds for each 50 gallons of juice.

From these tanks the juice is pumped into large tanks, which act as reservoirs for the homogenizers and can fillers.

The homogenized juice is heated to about 200°F. by means of a tubular heater before it is piped to the bowls of the filling machines, from which it is packed into bottles.

The bottles of juice are then sealed under vacuum and then passed through water at 200°F. to insure sterilization. They are then cooled down and packed into cases.

TOMATO CATSUP

In the manufacture of tomato catsup the tomatoes are first scalded with steam, and then converted into pulp. The tomatoes are now passed through pulping machines or finishers, in which they are forced through a fine mesh cylindrical screen which removes skins, seeds, and undesired parts of the tomato. The pulp is then pumped to the catsup boiling tanks, where it is mixed with salt, vinegar, and various spices. A common proportion is 70 pounds of salt to 500 pounds of sugar, and sufficient vinegar to yield 1.6 per cent. acetic acid in the final product.

When a batch of catsup reaches the proper consistency in the boiling tank, it is emptied through a finisher similar to those described for tomato juice. This serves to

smooth out the catsup and to eliminate any tendency to be curdy. From a receiving trough under the conditioner the catsup is pumped to supply tanks over the filling machines from which it flows into the bowls of the bottle-filling machines. If the catsup is filled hot into the bottles at a temperature around 205°F. it may not be necessary to sterilize them. But, if filled under 170°-180°F. it will be necessary to pasteurize them for 45 minutes at 185°F.

MANUFACTURE OF CONCENTRATED TOMATO PULP AND CATSUP

The open kettles used for concentrating tomato pulp may be of wood, copper, block tin, monel, or glass lined. The open kettles are often not steamjacketed, but are heated by closed copper coils, 3-inches in diameter. These coils are known as flash coils. Under normal conditions it will take 35-50 minutes to concentrate 50 gallons of pulp to one-half its volume with the use of flash coils.

COOKING THE PULP

While concentrating the pulp, there may be considerable foaming. To prevent this to some extent, add a small amount of cottonseed oil. The kettle is filled with the tomato pulp, just enough to cover the coils or steam-jacketed part of the kettle. Steam is now admitted and the boiling is started. The concentration must be accomplished rapidly to retain the bright colour. Boiling for 30 minutes is usually sufficient if equipped with a tank having a good flash coil and enough high pressure steam. The finishing point of the tomato pulp, or puree, is a specific gravity of 1.05.

Spices are usually added to tomato catsup as a vinegar extract, prepared by adding the spices to distilled vinegar and steeping at around 185°F. in a covered wooden or glass-lined tank for 2-3 hours. The special vinegar is now separated from the spices and added to the pulp in the catsup kettle. Sometimes onions, garlic, and spices are tied in a bag and suspended in boiling catsup for extraction. In this case the spices are used a second time by replenishing with more fresh spices.

TYPICAL CATSUP FORMULA

Heavy Concentrated Tomato Pulp (Puree) 100 gal. (Sp. Gr. 1.06).

Salt	28	lbs.
Sugar	200	,,
Chopped onions	25	,,
Cinnamon	25	oz.
Mace	3½	,,
Cloves	15	,,
Allspice	15	,,
Cayenne	3⅓	,,
Chopped garlic	4	,, (optional)
Ground Paprika	2	oz.
Vinegar (100 grain)	15	gal.

Prepare the spice extract with vinegar, but leave out the onion, garlic, and paprika. Add these three separately. The puree is now boiled up quickly, usually in an open tank. Add the sugar and towards the end add the salt. Very near the end of the cook, add the spice vinegar extract.

Tomatoes (after removing skins, seeds, and green spots)	30	lbs.
Salt	1¼ to 1½	cupfuls.
Redistilled Vinegar	2¼ to 3⅓	,,
Sugar	5 to 8	,,

If redistilled vinegar cannot be obtained, use 4½ to 6⅓ cups of white vinegar, 5% strength, or 6 to 8 cups of cider vinegar, 4% strength.

TOMATTO COCKTAIL

Pure fresh tomato juice	100.	gal.
Fine salt	12	lbs.
Fine granulated sugar	18	,,
Finely ground white pepper	¾	oz.

Add the salt and sugar directly to the tomato juice with a minimum amount of agitation. The salt and sugar are so fine they are readily soluble. The pepper should be sifted in evenly and smoothly. If added too rapidly it may form clots or clumps, which are very difficult to break up.

With the above recipe as a base, any number of interesting speed flavours can be produced. For example, any number of varieties of pepper, sweet as well as hot typed, can be employed. Also various types of seeds, such as caraway and coriander, can be tried.

The tomatoes are washed, cored and cut into thin slices. To each 10 or 15 lbs. of tomatoes 1 lb. of onions, sliced thin, and ½ cup of salt are added. The tomatoes, onions and salt are mixed and allowed to stand overnight. The juice is drained from the vegetables after which the following materials are mixed with them: ½ lemon, sliced very thin, 3 medium size red peppers, chopped fine, 1 tablespoonful ground mustard, 3 cups good cider vinegar and the spice bag containing 1 tablespoonful each of whole black pepper, whole allspice, whole cloves and celery seeds. After thorough mixing the materials are boiled slowly for 30 minutes. The spice bag is removed, the hot pickle is filled into clean, dry jars which are then partially sealed and processed in the water bath, one pint-jars 15 minutes, and quart-jars 18 minutes.

TOMATO PRESERVES

In making preserves the pear, pulm or peach types of tomatoes are best suited. Both the red and yellow tomatoes may be used. They may be made as pure tomato preserves or the flavour may be modified with a few slices of lemon. The tomatoes should be just ripe—neither green nor soft. They are blanched 15 to 30 seconds or just long enough to cause the skins t[o] slip easily. When removed from th[e] blanching water they must be cooled a[t] once in cold water. The skins are removed but as a rule the core is not cut out a[s] in canning. For each pound of prepare[d] tomatoes 1 lb. of sugar and ½ cup of wate[r] are required. The sugar is dissolved i[n] the water and heated to boiling. Th[e] tomatoes are added to the boiling syru[p] and gently boiled until fruits are tender. They are then set aside for 24 hours. Th[e] syrup is drained and measured and i[s] concentrated to two-thirds of the measured volume and poured while hot over th[e] tomatoes. After standing 24 hours th[e] syrup is again drained and concentrate[d] until it will give a jelly test. The preserves are packed into clean, dry jars, fille[d] with the hot syrupy and processed for on[e] or two minutes in the water bath.

CANNING TOMATOES

In canning the tomatoes selecte[d] should be well ripened on the veins. The[y] should be handled carefully and the[y] must be absolutely free from rot. The[y] should be graded for colour and to som[e] extent for size. Tomatoes that have considerable green around the stem shoul[d] be avoided, but if one must can them, al[l] the green parts should be cut away.

Tomatoes are first thoroughly washe[d] to remove all soil. They are then blanched in boiling water for about 1 minute o[r] just long enough to cause their skins t[o] slip easily. As soon as blanched they ar[e] cooled in cold water and are then read[y] for peeling and coring. Over-blanchin[g] will make the tomatoes soft and under-blanching will cause waste of time removing their skins. The cores should b[e] removed first. This is done with a short-blade, sharp-pointed knife. By insertin[g] the knife into the base of the tomato nea[r] the stem and to about the centre of th[e]

fruit, and cutting around the stem, keeping a half-inch or more from it, a cone-shaped portion is quickly removed. This is mostly solid material and is not desired to be canned product. A few trials should enable one to judge as to the size of cut necessary to remove the entire core.

The skins are then stripped off. This is most easily done by beginning at the blossom end. Often there is a small black spot at the blossom and which should be cut out. When a sufficient quantity of peeled tomatoes has been secured they are packed into the containers. If too large to pass readily through the opening they are cut into suitable size and are then packed closely enough to set free sufficient juice to fill all spaces between pieces and to cover the solids.

It is a violation of the pure food law to add water or the juice from other tomatoes. This law applies to all tomatoes canned for market in U.S.A.

Glass jars should be packed full. A half-teaspoonful of salt is added to each pint jar. Glass jars are partially sealed and processed in the hot water bath at 212°F or 100°C., pints 30 minutes, quarts 35 minutes.

MANUFACTURE OF VINEGAR

VINEGAR is a dilute form of acetic acid having a flavour that varies according to the source from which it is obtained. It is extensively consumed in the preparation of pickles and sauces, and as a table condiment. It is also used in medicine and in the manufacture of ink. Since it affords such a large profit that merchants and grocers who retail vinegar should always have it made under their own eye.

The materials generally used in manufacturing vinegar are cider wines, decoctions made from malt, sugar solutions, diluted alcohol mixed with malt infusion, glucose and molasses.

The first step in the manufacture of vinegar is the preparation of an alcoholic wash, containing also sufficient nutriment for the acetic bacteria.

In the production of spirit vinegar a diluted spirit derived from potatoes or maize starch is mixed with a small proportion of phosphates and ammonium salts. Wine vinegar is made from diluted wine, and cider vinegar from sour cider or from apple juice. Any substance capable of fermentation so as to yield an alcoholic liquor is also capable of acetification under suitable conditions, but the bulk of vinegar now manufactured from malted or unmalted grain or from a mixture of cereals and fermentable sugars.

The malt or malt and grain is infused in a mash-tun or saccharified in a "converter" by means of a dilute acid, and the alcoholic wash thus produced is clarified and acetified as subsequently described.

The most suitable form of mash-tun for vinegar brewing is one provided with rakes, and also with a steam coil beneath the perforated false bottom, to enable the temperature of the mash to be raised gradually from a relatively low temperature. If a mixture of malts and unmalted grain is used, a malt of good diastatic power may be obtained, but when malted barley is being used alone a malt of low diastatic power will give good results.

The malt or mixture of malt and grain is crushed and is then passed through a Steel's mashing machine into the mash-tun, with the calculated quantity of water to give a mash at a temperature of about 120°F. The temperature is then very slowly raised by means of a steam coil at the bottom of the mash-tun. After the temperature has in this way been gradual-

ly brought upto 152°F, while the articles have meanwhile been kept in constant movement by the rakes in the tun, the mashing is continued until the liquid no longer gives a blue coloration with iodine.

The infusion is then drained off and a second mash is given with a smaller quantity of water at 155°F, this extract being drained off as before. Finally the goods in the tun are washed from above with water at 155°F, which is distributed over their surface from the arms of a revolving sparge. The united extracts are cooled to about 70°F, by means of refrigerators and are then fermented with yeast.

The wort obtained in this way is readily fermentable, but the use of low dried diastatic malts and low temperatures for mashing has the drawback of yielding vinegars which are sometimes very difficult to free from a slight degree of cloudiness. The turbidity appears to be partly due to albuminous substances, which can be coagulated by boiling and afterwards removed by filtering. But this method is not followed by the vinegar maker because in that case the dextrins are converted into unfermentable substances and thus it reduces the yield of alcohol and subsequently the acetic acid.

The usual practice is to use a malt that has been dried at a medium temperature. This will give a wort which in fermenting yields the highest percentage of alcohol.

ACETIFICATION OF THE WORT

In this process the alcoholic wash or wort has been subject to the combined action of the acetic bacteria atmospheric oxygen to convert it into vinegar. The oldest method of effecting this change was by exposing the casks partially filled to the air, with their bungs drawn out This method is now obsolete as it takes too much time for perfect acetification and is much depended on the atmospheric condition. The modern practice of acetification is carried on in vats instead of casks. These vats are provided with perforated false bottoms, on which rests the fillings of beech wood shavings reaching nearly to the top of each vat. Over the shavings a few inches below the cover is a perforated wooden plate. The beech shavings are boiled with water and then soaked in strong vinegar, before filling into the vat. Their purpose is to spread the liquid into thin films, so that the oxidation may be rapid.

The cooled alcoholic wash or gyle as it is commonly called, impregnated with acetic acid bacteria, is pumped from the bottom of the vat and discharged into the funnel at the top which is boxed in to prevent loss by evaporation. The liquid flows down the tube, enters the sparger, which revolves on a pivot. In the arms of the sparger are a number of holes through which the liquid rushes, thus causing the sparger to revolve steadily and uniformly sprinkle the surface of the basket-work. The liquid comes in contact with the current of air passing up through the mass, the alcohol is rapidly oxidised into acetic acid. The temperature within the vat rapidly rises, causing the air to rise and escape through the openings in the top, while fresh air enters through the holes in the sides of the vat thus causing a continual circulation of fresh air within the vessel. The temperature is kept as near 85°F as possible, regulating the temperature of the air admitted into the vat. If allowed to go too high, much alcohol is lost by evaporation and the vinegar is weak. Too rapid an air current also evaporates much alcohol The vinegar formed collects under the false bottom, and flows out through a syphon. To increase the strength of

the vinegar the process is repeated with a small quantity of alcohol.

Exact regulation of the strength and flow of malted liquid, and of the amount of air admitted is essential to successful working. Considerable alcohol is lost by evaporation. The air leaving the converters is often washed with pure water to recover the vapourised alcohol and acetic acid. If vinegar eels appear it is customary to kill them by adding hot vinegar until the temperature of the vinegar running out of the cask has risen to 120°F.

FILTRATION

After leaving the acetifiers, the crude vinegar is pumped into store vats, where it is allowed to remain for several weeks or months to mature. During this storage period it deposits albuminous matter, bacterial cells, etc., and undergoes partial clarification. The liquid is then syphoned to filtering tanks filled with paper pulp, through which it percolates.

CLARIFICATION OF VINEGAR

The persistent cloudiness, which occurs in certain vinegar is sometimes more rapidly removed by a process of clarification than by filtration. The methods employed are sometimes mechanical and sometimes chemical. In the first case an insoluble substance such as kieselguhr is stirred up with the vinegar and as it slides it carries down with it the albuminous particles to which the turbidity is due.

In chemical methods the albuminous substances may be precipitated by the addition of a gelatinous agent such as isinglas. It is next sterilised.

STERILISATION OF VINEGAR

After filtration or clarification, vinegar will still contain acetic bacteria and when exposed to the air will soon become coated with a zoogloeal film. This can be removed by long continued storing which is very troublesome to manufacturers.

Since all the species of acetic bacteria perish at a relatively low temperature, it is sufficient to heat the vinegar to 150°F. This process of sterilisation is most simply effected by passing the vinegar through a coil surrounded by a tank of water, which can be heated by steam to the sterilising temperature. On leaving this heating tank the vinegar is passed through one or preferably two other coils chilled by a current of cold water and is thus cooled down nearly to the normal temperature and leaves the sterilising apparatus without any appreciable loss of acetic acid. Finally the vinegar is bottled and ready for the market.

PANPAR

PANPAR or papadam is a kind of pulse cake used in many parts of India as an adjunct of food. It is a highly appetising article and therefore, much relished. On being fried in oil or ghee the article will puff up considerably and become crisp. It remains so for some time but in contact with air it becomes softer and softer. It is a belief of many up-country people that without taking panpar, food will not be digested properly. Though panpar itself is a difficultly digestable article but it acts as a catalytic agent and helps the digestion of food. Several of its ingredients, namely assafetida, sajji (natural sodium sulphate), black pepper, etc. possess digestive properties. The consumption of panpar is very large in Madras, the Punjab, Rajasthan, Uttar Pradesh, etc. The procedure of making panpar is slightly different at different places. We give here only the general process which in itself is almost the same throughout the country.

TYPICAL RECIPE

The following are the ingredients that go into the composition of panpar:—

Ground Kalai Pulse	5	lbs.
Ground Moong Pulse	5	,,
Salt	½	lb.
Sajji (crude sodium sulphate)	¼	,,
White pepper	90	grains.
Assafoetida	90	,,
Black Pepper	180	,,

First of all prepare the khamira of sajji. For this purpose break the sajji into small pieces by means of hammer. Put these bits in 10 lbs. of cold water in a earthen or enamelled basin and keep it aside for 5 to 7 days. During the first two or three days stir the sajji with a rod twice or thrice per day for 10 to 15 minutes each time. In this way the saji solution will be sufficiently matured for mixing with the ground pulse. On the 7th day decant about 5 lbs. of clear sajji solution without stirring up the undissolved saji.

Now coarsely grind the peppers both black and white and mix into the ground pulses. Then add to it the salt. After thorough mixing the ingredients all together pour into it the sajji solution which is kept ready beforehand, small amount at a time and knead by a wooden mallet or club to produce a stiff dough. In no case add too much saji solution, this will make the dough rather too soft. When the dough is perfectly uniform divide it into small bits of desired sizes. These small lumps are subsequently rolled out into thin circular flaps like chappati measuring 8 to 12 inches or more of diameter. As the dough is not soft like flour dough • the operation of rolling is very laborious and difficult. It should be done by pressing the lump over the rolling stone, which is smeared with a little mustard or groundnut oil. While rolling it shrinks somewhat on releasing the pressure. For this reason it may be rolled out lengthwise in the form of tape with three inch wide. When this long sheet keeps its form without shinking the rolling out of the sheet may be done by pressing and rolling of the edges. In this way a perfectly circular flap may be produced. Without demonstration it is very difficult to explain by writing. However, the above expression will give an idea about the rolling out of the panpars.

Sometimes the dough is made slightly soft by the addition of a little more sajji solution. Of course, there is some advantage of making circular sheets with this soft dough but main drawback is that the keeping quality of panpar will be shorter period. A type of mould will appear over the surface due to some moisture content in the article. But the panpar made from stiff dough as stated above will remain fresh even for a year.

The panpar after being rolled out in a circular form is spread on a fibre mat and dry in the sun. After this these are placed one over another and packed.

POTATO PANPAR

The article, which is sold in the market in the name of potato panpar, is really not made of potato. It is simply made from ordinary panpar cut into small size by means of a biscuit cutter or punching machine.

In the recipe we have mentioned only two kinds of ground pulses—one is Kalai and the other Moong. It has been found that ground Kalai pulse is absolutely necessary in making panpar because it contains a kind of adhesive substance which is absent in other pulses. So all types of Moong panpar contains a certain proportions of ground Kalai pulse. But

the good types of panpar should be composed of at least 75 per cent. Moong pulse and 25 per cent Kalai pulse.

I

A few more practical recipes are given below for the benefit of the intending manufacturers. Soak moong pulse in water; remove the bran by rasping in several changes of water. Strain away the water and bray the soft pulses into a fine paste. Incorporate gradually into this paste a quantity of fine gram meal sufficient to convert the mass into a stiff dough. Knead the dough intermittently with the addition of the meal for 2 or 3 hours. Divide the mass into small bits and roll out each into thin circular flaps dusting with gram meal. Keep them separately. Dust them when dry and pack in tin containers.

II

Soak Khesari pulse in water; wash them when thoroughly soaked. Grind them well and mix mass for some time until a smooth soft dough is obtained. Divide the mass into small bits and roll them out with khesari meal. Spread them out and pack when dry.

III

Boil chana pulse until it is soft; strain away the water and bray to a paste. Add moong meal to make a hard mass. Knead thoroughly; and incorporate the following spices; cassia leaves, capsicum, coriander seed, black pepper—baked and powdered —in suitable proportion. Knead again and make into a dough. Divide it into small bits and roll them out into thin circular cakes with oil. Spread them out on plantain leaves and pack when dry.

IV

Boil together matar, khesari and gram pulse in equal quantities until soft. Strain away the water and bray into paste. Mix moong meal to make a stiff mass. Add a little mustard oil and knead thoroughly. Incorporate the following species; cassia leaves, cardamom major, clove, black pepper in powder. Knead again into a dough; divide into small bits. Roll them out with oil and spread out to dry and pack.

V.

Soak urid pulse in water and remove the bran and take equal quantity of chowli. Bray into a paste and add meal of matar pulse to make a hard mass. Add small quantities of powdered black cumin seed, fenugreek and pepper during kneading. Make into small balls, moisten with oil and roll out. Spread them separately and pack into tins when dry.

In conclusion it is not out of place to mention that the prospect of panpar making is very bright as the consumption of this stuff is daily increasing. Another advantage is that this industry can be started with a few hundred rupees and its site may be selected not only in large cities but also in a sub-divisional town and even in well-populated villages.

TAPIOCA INDUSTRY

TAPIOCA is a root crop and contains a large percentage of starch very suitable for edible purpose. It is very nourishing and is consumed by a large section of people in South India.

The following is the detail method of its cultivation:—

SOIL

This crop is grown in all kinds of soils which are well drained. It is a common crop in the sandy tracts and in laterite slopes. In virgin loamy soils the crop yields very heavily. Drainage is a very essential condition for the success of this crop. The land which would not admit of free drainage should never be selected for its cultivation.

SEASON

This commences with out-burst of the nsoon and extends upto October ac-ding to the nature of the soil. In low ng places when there would be sufficient isture in the hot weather and too much it in the rainy season, planting may be ayed upto October. But the best time planting in high lying dry lands would July-August in South India and Sep-iber-October in Northern India.

PLANTING

The crop is propagated by planting stem. Green stems possessing se scars, hardly and less pithy and as consequence least liable to white ant acks are to be selected. They are cut settes 6 to 9 inches long and the bot-ı ends which go into the ground are ped into ashes and are pressed down the soil having about 3 inches above und. The planted settes are to be ered lightly with paddy, straw or some ed leaves.

SYSTEM OF PLANTING

There are three systems of planting, nely (a) ridge, (b) mound, and (c) .

Ridge System.— In this system the und is ploughed two or three times. e turfs and weeds are collected and ped in rows 3 feet apart. From ween the rows earth is taken l thrown on either side covering f so as to form ridges about 1 to 1½ t high leaving just a foot wide trench he middle. On the crest of the ridges s are planted 2 feet apart.

Mound System.—Ridges are formed above but narrow cross channels are le separating the long ridges into little unds. Each of these little mounds re-es a sett.

Flat System.—In this system of planting the ground is well dug 1 to 1½ foot deep. First a furrow is made close to the boundary bund and leaves are applied along the furrows. The first furrow is then covered with earth taken out for making the second furrow and this latter is covered with the earth from the furrow. Thus the whole field is worked up. Along the row supplied with leaves as stated above, setts are planted. The same distance between the setts namely 3 feet by 2 feet is maintained in all the three systems. The flat system is the best, and the heaviest yield is obtained when this is followed.

MANURING

In virgin lands much manuring is not necessary for the first cultivation. The crop is an exhausting one and as such it requires heavy manuring. A handful of a mixture of well rotten farmyard manure and ashes is to be applied to each sett either at the time of planting or six weeks after, at the time of hoing and weeding. The first manure composition at the rate of one handful per plant has given excellent results.

HARVESTING

The crop has to be hoed and weeded twice at intervals of about two months. It is ripe for harvest after 8 or 9 months. If there is sufficient moisture in the soil, harvest can be done by pulling out the stems. The broken root, if any, are dug out separately. The yield varies from five to ten thousand pounds per acre.

Having dealt with a few points concerning the cultivation it will be well to turn the process of extraction of starch from the roots.

Before discussing the method of extraction it will be well to state that good water free from iron may be used.

This is absolutely necessary because the tapioca contains a certain percentage of tannin so there is every possibility of formation of iron tannate if iron is present in the water. This will give the starch a dull grey appearance. So while extracting starch pure well water and no contact with iron or steel is essential.

Wooden or copper or earthen pails and bamboo or copper sieves should be used.

EXTRACTION OF STARCH

The first part of the process can either be done mechanically or by hand and consists in washing the roots to rid them of all dirt and soil. This if done by machines, is accomplished by having a rotating wooden cylinder known as the "Scrubber" which is revolved in a tank of running water. The cylinder can conveniently be made of wood and the raw materials fed in from one end. The sides of the cylinder are perforated with holes to allow water to pass freely around the roots. The jostling and the rubbing during rotation is the primary course of the cleaning of the roots, and after half an hour's treatment they are ready for the next process.

The second part consists in pulping the roots with a disintegrator. This is a cylinder about 2 ft. long and 18 inches in diameter and its sides consists of numerous toothed edges which are replaceable and are fitted into the place by wooden blocks. The appearance of this machine is very much like a huge coconut grater and it is so mounted that, as it rotates, the rotation carries round the roots a they are passed against a sloping side at the bottom of which is a small hole for outlet. The roots are put into the cavity between sloping side and the machine while a stream of water passes along with the pulp of the roots as a milky mass. It then flows through a sloping channel down to another machine which is very much like a huge cylindrical sieve and is about 12 ft. long and 5 ft. in diameter. This is known as the pulp screen and the water washed from the disintegrator is passed into it. The mesh of the gaze is about 80, and it is fitted on to the cylinder as small troughs about 3 ft. long so that 16 of them completely cover the whole circumference. On rotation with a stream of clear water running into the top of it, the dirt and impurities remain behind and the clean materials pass on. These are conducted down a channel into settling vats, which are really concrete tanks 6 ft. by 10 ft. in area and 3½ ft. deep. Each of these vats is capable of being opened or closed to the centre channel at will. The pulpy water is then allowed to remain still and the flour settles down. The water is then drawn off by decantation and the sticky starchy mass is left. At the bottom is the impure flour and at the top the purer form. The mass is now cut out by women who carefully separate the upper layers from the lower, as being purer, and the two portions are stored separately calling them No. 1 and No. 2, quality, No. 1 is then taken and put through the whole process of disintegration washing twice again and finally when the third wash is complete the chunks of flour are cut by women and placed in the sun on tables to dry. No. 2 is dried and sold at cheaper rates. Care must be taken to avoid rain and a small screening rod is necessary. The fibrous matter in the root has been stopped in the pulp screen and can now be utilised as already indicated for the manufacture of "Teluscite." After the white blocks of flour are dry and thoroughly bleached in the sun they are ground in roller mills into fine flour and after this they are passed through a 100 mesh wire sieve and packed into bags for export. The factory would be best placed on a hillside or slop-

ing ground so as to secure gravitational flow of the liquid from machine to machine. The process is simple and the factory can be worked with a small number of skilled hands.

INDUSTRIAL USES

Tapioca plant is largely consumed as an articles of food. The root yields valuable starch or flour which is largely used as size for paper, cloth, for the manufacture of gums, etc. and also for starch and human food. Flaked tapioca, for human consumption is produced by a slight variation of the machinery and the dried refuse of the factories when mixed with molasses gives a valuable fodder for cattle.

RICE SUBSTITUTE FROM TUBERS & MILLETS

CONSEQUENT on the present shortage of rice and other staple foods, it has become increasingly necessary to make up the deficit through other sources. Among these, the most promising are tubers, e.g., tapioca and sweet potato, which can be produced more abundantly than cereals. Tapioca and sweet potato are deficient in porteins and are, therefore, by themselves, poor substitutes for cereals. In an earlier paper from this laboratory it has been shown that incorporation of groundnut cake flour to the extent of 20 per cent with tuber flours makes up for the deficiencies of the latter and the nutritive value of a mixture of tapioca flour (80 parts) and groundnut cake flour (20 parts) is superior to that of rice. More recent investigations (unpublished) have shown that the replacement of 25 per cent of rice or wheat by tapioca or sweet potato flour does not lead to any deterioration in the overall nutritive value of poor rice or wheat diets, as judged by the rate of growth of young rats.

In suggesting alternate food substitutes for rice, we have to take into consideration not only their nutritive value but also their acceptability from the psychological point of view. Food in the form of flour, though readily acceptable to wheat and millet eaters, is not psychologically acceptable to rice eaters accustomed to eating food in the shape of grains. Investigations were, therefore, undertaken to explore the possibility of preparing rice substitutes from tapioca (with and without the addition of groundnut cake flour) and also from millets.

The possibility of preparing rice-like grains from various sources has been investigated by a number of previous workers. Particular reference may be made to the pioneering work of Bhatnagar and his associates who produced rice-like grains from broken rice (private communication). More recently, rice-like grains have been produced in other countries from wheat flour which were used as substitutes for rice during the last war. Tuber flours have not, however, so far been used for such a purpose because of certain practical difficulties. Millets offer more scope in this direction.

For the processing of maize, the grain is first steeped in water containing a trace of sulphur dioxide (0.02 per cent) for two days till the skin is softened. It is then washed and crushed with addition of fresh water. The resulting paste is passed through fine sieves to separate the skin from starch and protein. The mixture of the latter could be used as such or sent over tables so as to separate as much of the gluten as possible if a white product is desired. Groundnut cake flour (10 per cent) and decalcium phosphate (0.5 per cent) are then added to provide extra protein, B vitamins and minerals. Sufficient water (one and a half times the

weight of the mixture) is added and the mixture cooked to a thick pasty mass. This is then pressed through a perforated disc into strands of about the same thickness as rice. These strands are partially dried in the sun or in a drier at about 45°-50°C. and cut mechanically into small pieces of the same size as natural rice grain and finally dried completely.

For the processing of a mixture of tapioca flour and groundnut cake flour, the following method which is similar to that employed commercially for the manufacture of sago from tapioca starch is adopted. The method of pre-cooking does not work satisfactorily in the case of tapioca.

Tapioca flour or a mixture of tapioca flour with groundnut cake flour or jowar (Sorghum vulgare) flour is moistened with water (about 50 c.c. water being added to 100 gm. of the mixture). The moist flour is granulated by passing it through a wire-mesh (6-8 to an inch) and then shaken in trays with a cloth bottom for 20-30 min., when the flour is converted into round grains. The wet grains are roasted in a metallic vessel with a trace of deodorized hydrogenated oil over an electric heater until the grains gelatinize and harden. The roasted grains are finally dried in the sun or in a drier at 50°—55°C.

The appearance and cooking quality of different samples of rice substitutes are given in Table I.

Table I

Sample No.	Composition.	Appearance.	Appearance & Taste of the cooked product.
1.	Maize starch, 89 parts + groundnut cake flour, 10 parts + salt mixture (Steenbock), 1 part.	Dull white	The cooked product has a dull white appearance; acceptable taste.
2.	Maize flour (dehusked), 89 parts+groundnut cake flour, 10 parts + salt mixture (Steenbock), 1 part.	Light yellow	The cooked product has a light-yellow colour; acceptable taste.
3.	Tapioca flour, 99.5 parts + decalcium phosphate, 0.5 part	Dull white	Cooks to a pasty mass similar to sago; taste, good
4.	Tapioca flour, 89.5 parts + groundnut cake flour, 10 parts + decalcium phosphate, 0.5 part	Light brown	Cooked product rather pasty; taste, good
5.	Tapioca flour, 69.5 parts + jowar flour, 25 parts + groundnut cake flour, 5 parts + decalcium phosphate, 0.5 part	Light brown	Cooks like unpolished rice, the cooked grains remaining separate from one another
6.	Tapioca flour, 70 parts + groundnut cake flour, 20 parts + broken rice, 10 parts	Light brown	Cooked product rather pasty; taste, good
7.	Tapioca flour, 70 parts + groundnut, cake flour, 20 parts + wheat, 10 parts	—do—	—do—

From the data given in Table I, it will be evident that the cooking quality of the rice substitutes prepared from maize and also from a mixture of tapioca, jowar and groundnut cake flour (No. 5) is better than that of rice substitutes prepared from tapioca flour and groundnut cake flour. This is due to the fact that the cereal starch, on cooking, sets to an opaque jelly, whereas the tuber starch sets to a glassy and pasty mass. Further experiments were, therefore, carried out to improve the cooking quality of tapioca flour and starch.

Schoch ascribed the difference in the cooking quality between cereal and tuber starches to the presence of popular fatty acids in the latter. He reported that after the removal of fatty acids from maize starch and rice starch by solvent extraction, the fat-free starches on cooking gave more transparent and glutinous gels th untreated starches. In view of the above findings, the effect of incorporation of cer tain higher fatty acids, viz. stearic, palmi tic and oleic acids, on the cooking qualit of rice substitutes prepared from tapioc flour and sago from tapioca starch wa studied. The results showed that the in corporation of higher fatty acids at 1 pe cent. level definitely improved the cookin quality, the cooled product appearin opaque and less pasty. The cooked pro ducts had an agreeable flavour and tast

The nutritive value of two of the ric substitutes (Nos. 6 and 7 in Table I), a compared to rice, was determined by th rat-growth method. Groups of youn rats, about 4 weeks old and weighing 45 50 gm. (8 in each group), were fed for period of 8 weeks on three different diet: one based on rice and the other two base on rice substitutes (Nos. 6 and 7). Th other constituents were the same in all th three diets. The results are given i Table II.

Table II

Average weekly increase in body weight of young rats fed on different diet for a period of 8 weeks

Diet No.	Quantity of rice or rice substitutes in the diet*	Average initial body wt., gm.	Average final body wt., gm.	Average weekly increase in body wt. gm.	
1.	Raw milled rice (78.5%)	50.2	81.5	3.9	0.2
2.	Rice substitute No. 6 (78.5%)	49	110	7.6	0.5
3.	Rice substitute No. 7 (78.5%)	49	105	7.0	0.37

It will be seen from Table II that rice substitutes prepared from a mixture of tapioca flour (70 parts), groundnut cake flour (20 parts) and rice or wheat (10 parts) possess a higher nutritive valu than rice. A study of the nutritive valu of other rice substitutes and also the effe of incorporation of fatty acids on the nu

* All the diets contained the same quantity of other foods, viz. red gram, 5.0 per cent; non-leafy vegetables (brinjal, potato and raw plantain), 8.2 per cent; leafy vegetables (amaranth, cabbage, etc.), 2.1 per cent; crude groundnut oil, 5.0 per cent; milk powder, 0.9 per cent; and common salt, 0.8 per cent.

tritive value and availability of calcium and phosphorus present in them is in progress.

The present investigation has shown that it is possible to prepare substitute grains from maize and tapioca flour which can be used as partial substitutes for rice. Even though the products obtained from a mixture of tapioca flour and groundnut cake flour have a light-brown colour, still the cooked products are quite palatable. They could be cooked either as such or admixed with rice. Consumer trials carried out with different food preparations made out of the rice substitutes showed that they were generally acceptable.
—REPRODUCED FROM JOURNAL OF SCIENTIFIC & INDUSTRIAL RESEARCH.

SULPHONATED OILS

WHILE sulphonated oils are not used to any great extent in the manufacture of soap, they do have a few small uses. However, they are used widely in the dyeing and printing of turkey and alizarine reds on cotton as well as other colours. They are sometimes called "soluble oils." Turkey red oil, or sulphonated castor oil, is the best known of the sulphonated oils. These are also available for numerous uses in the textile, leather, metal, and other trades, various other sulphonated oils such as sulphonated olive, corn, lard, sunflower, herring, cod, whale, as well as fatty acids of these and other oils, and the sulphonated alcohols of these fatty acids. Sodium lauryl sulphate, for example, is made from sulphated lauryl alcohol, which alcohol in turn is derived from lauric acid, one of the important fatty acids of coconut oil,—the one in fact which gives coconut oil soaps such profuse lathering properties.

Sulphonated oils have the advantage in textile and other processes of not being affected by dilute mineral acids or the salts present in hard water. In addition to the above uses, they also find application in the soaking out of silk, in soapless shampoos, in certain shaving creams, as emulsifying agents in disinfectant manufacture, as a spreader for oil sprays and insecticides, and in giving flexibility to glues and adhesives coated papers. There are innumerable derivatives and mixtures of the sulphonated oils which find other specialized uses.

The process of manufacturing sulphonated oils, particularly sulphonated castor oil, is quite simple and has not changed much over the years in practical manufacture in spite of much research and a widening of the uses of these oils. The equipment necessary is a tank of wood approximately two and one half times the capacity of the amount of oil to be treated. Preferably the tanks should be lead-lined and equipped with stirring apparatus, and with a means of controlling temperature. There are furthermore required other tanks to hold the solutions used, such as caustic soda, ammonia, and acid. The tank in which the sulphonation is to be conducted should be provided with a valve at the bottom and a gauge to measure accurately the contents. The temperature should be kept quite low druing the sulphonation, preferably below 30°C. and at no time should it be permitted to go above 40°C. (104°F). For the sake of safety, the temperature of the oil at the beginning of the sulphonation should be between 15 and 20°C. The finished product may be spoiled for some purposes if the temperature rises above 40°C.

The process is carried out as follows: —300 pounds of castor oil are placed in the tank and 80 pounds at 66°B. sulphuric acid are weighed out in another vessel. The acid is run into the tank containing the oil in a very thin stream while the oil

is well stirred. At no time should the temperature exceed 40°C. This operation should consume at least an hour and stirring should be continued half an hour longer to insure the thorough mixing of the oil with the acid. The mass is then allowed to settle for 24 hours, after which 40 gallons of water are added and the mixture stirred until it has a uniform creamy colour with no dark streaks. This mixing process should be carefully carried out and when completed allowed to settle 36 hours.

At this point the mass will have separated into two layers, the lower layer consisting of a water solution of acid and the upper layer of oil. The former is run out through the valve located at the bottom of the tank. Another wash may now be given or dispensed with as desired. In this wash the addition of salt or sodium sulphate at the rate of 1½ pounds per gallon of water is advisable. A 24°B. caustic soda solution is prepared and added slowly to the acidified oil with constant stirring. The mass first turns creamy, then becomes streaked, increasing in streakes as the caustic solution is poured in, and finally becomes clear and transparent. Water is now added to bring the volume to 75 gallons. The oil is now milky in appearance, but the addition of a little more soda solution restores the transparency.

In some cases ammonia is used in addition to caustic soda in neutralizing the oil Three-fourths of the amount of caustic soda required to complete the neutralization is first added and then the neutralization is completed with a one to one liquid ammonia and water solution.

There are numerous other methods and varieties of sulphonation but this is one of the simplest and easiest to handle.

INCENSE STICKS

THE burning of incense in temples and prayer halls is considered a necessity to purify the atmosphere with aromatic fumes. The ingredients that come into the composition of incense are: Sandalwood, aguru, gugul, (Olibanum) nagarmoth, jotamansi, costus root, gum benzoin, balsams, dammar, bark of cascarilla, essential oils of sandal, patchauli, etc. camphor, musk and also nitre, charcoal, gum acacia, etc.

PRINCIPLE OF MANUFACTURE

In the manufacture of incense sticks, woods and spices are reduced to fine powder. The required amount of these powders are weighed out first and mixed. The mixture is then made into a thick paste with mucilage of gum acacia or gum tragacanth. The sticks are of bamboo splinters dipped in nitre solution and dried. These splinters are next vertically sunk into the fumigating paste taken in a wide-mouthed glass cylinder and withdrawn slowly. Observe that the coating is uniform. If not dip it again into the paste. Dry the stick vertically. Lastly pack.

TYPICAL RECIPES

A few well-tried recipes follow:—

I.

Musk	20	grains.
Ambergris	20	..
Powdered Benzoin	2	oz.
Powdered Camphor	2	,,
Powdered Cascarilla	2	dr.
Powdered Nitre	2	,,
Powdered Charcoal	4	oz.

Mix and make a thin paste with mucilage of tragacanth. Sticks are then made by dipping thin wooden splinters into this emulsion.

II.

Gum benzoin	100	parts.
Tolu Balsam	50	,,

Charcoal	700	parts.
Saltpetre	50	,,
Sandalwood Oil	15	,,
Patchouli Oil	15	,,
Cascarilla Oil	30	,,
Grain Musk	5	,,
Mucilage Acacia	q. s.	

Powder the gums, add the charcoal and saltpetre and spray on the essential oils. Finally mass with a mucilage of either gum acacia or tragacanth.

III

Aguru 1 ch., sandal dust 1 ch., gugul 1 ch., cassia leaves 1 tola, deodar wood 1 tola, jotamansi 1 tola, costus root ½ ch., vetivert root 1 ch., white dammar 2 ch., nagarmoth 1 tola, sugarcane molasses 1 tola. Mix these ingredients together; add 4 pieces of lakhi and soak for 3 days. Then grind well into paste and make into incense sticks.

IV.

Aguru 1 ch., white dammar 1 ch., gugul 1 tola, sandal dust 4 ch., lakhi 1 piece, cane molasses 1 tola, cassia leaves 1 tola. Mix them together and grind. Make incense sticks from the paste.

V.

Musk ⅛ tola, saffron 1 tola, aguru 1 ch., nilotpala 1 tola, benzoin 1 ch., dammar 1 tola, gugul 1 tola. Grind together these ingredients.

—PHARMACEUTICAL RECIPES

SODA MINT TABLETS

Sodium bicarbonate	25.0	grms.
Oil of peppermint	0.3	c.c.
Light liquid petrolatum	1.0	„
Starch, in fine powder to make 100 tablets	4.0	grms.

Mix the oil of peppermint and liquid petrolatum with the starch, add the sodium bicarbonate, and mix thoroughly by gentle trituration.

Compress in a tablet machine using 8 mm. die and punch to make 100 tablets.

COUGH DROPS

Brown sugar	10	lbs.
Tartaric acid	2	oz.
Cream of tartar	½	„
Water	3	pints.
Aniseed flavouring		q.s.

Melt the sugar in the water, and when at a sharp boil add the cream of tartar. Cover the pan for 5 minutes. Remove the liquid and let the sugar boil up to crack degree i.e. if a quantity of syrup is allowed to drop on the cool floor it at once sets to a hard mass. At this stage turn out the batch on an oiled stone slab, and when cool enough to handle mix in the acid and flavouring. Pass it through the acid drop rollers, and when the drops are chipped of, and before shifting rub some icing sugar with them.

EXTRACTION OF SANTONINE

Take of wormseed, 4 parts; hydrate of lime 1½ parts; mix and exhaust tnem with alcohol of 90%; distil off ¾ part of the spirit and evaporate the remainder to one half, which, at the boiling temperature, is to be mixed with acetic acid in excess, and afterwards with water; on repose, impure santonine subsides; wash this with a little weak spirit then dissolve it in rectified spirit, 10 parts, decolour by ebulitions for a few minutes with animal charcoal, and filter; the filtrate deposits colourless crystals of santonine as it cools; these are to be dried, and kept in opaque bottles.

CURING BURNS

Gum tragacanth	30	parts.
Gentian violet (1% solution)	1000	„

Allow to swell; warm and stir. Applied to burns this leaves a thin moist cooling, protective layer and rapid healing results.

Another preparation for curing burns is as follows:—

Boric acid in powder	1	part.
Soft paraffin	4	parts.
Hard paraffin	2	„

Melt, mix and stir till cold.

CUTICLE REMOVER

Sodium hydroxide	½	oz.
Glycerine	2	fl. oz.
Rose water	10	„

Dissolve the sodium hydroxide in a solution of water and glycerine, filter and keep the solution in rubber stoppered bottles.

CANTHARIDIN HAIR STIMULANT

Acetic ether	3	dr.
Cantharidin	5	gr.
Glycerin to produce	1	oz.

Reduce the cantharidin to powder and shake with the ether, then add the glycerin. Separately prepare the following mixture:—

Rose geranium oil	½	dr.
Eucalyptus oil	½	„
Rosemary oil	1	„
Bergamot oil	20	mins.
Borax, powdered	6	oz.
Caramel	1	dr.
Camphor powder	40	fl. oz.
Distilled water	40	„

Triturate the oils with the borax, add the waters, caramel and cantharidin solution; allow to stand for a fortnight, shaking daily. Filter through powder pumice (about 1 oz.) which should be shaken with the mixture before filtration.

It is to be used every morning and evening, well brushing after. The hair should be washed with soap and warm water, to which has been added a little rosemary hair wash powder.

REMOVING PIMPLE MARKS

Borax	3	grams.
Potassium Chlorate	120	„
Alcohol	30	„
Glycerine	60	„
Rose Water	760	„

Mix and keep aside for a week in a stoppered bottle. Then strain through a cloth and put in phials.

ACETUM CANTHARIDIS (B.P.C.)

Cantharidis	2 oz.
Glacial acetic acid	a sufficient quantity.
Distilled water	a sufficient quantity.

Bruise the cantharidis and macerate with 18 fluid ounces of a mixture of equal volumes of glacial acetic acid and distilled water for 24 hours; transfer to a percolator and, when the liquid ceases to pass, pour sufficient of the same menstruum in successive portions over the contents of the percolator to produce 20 fluid ounces.

—Recipes for Small Manufacturers

LIQUID PARMANENT HAIR WAVING

Sulphonated castor oil	8	oz.
Sodium pyrophosphate	3	"
Potassium pyrosulphite	16	"
Sodium sulphite	16	"
Soda ash	16	"
Monaethanolamine	5	"
Water	456	"

Mix.

DRY CLEANING FLUID

Glycol oleate	2	fl. oz.
Carbon tetrachloride	60	"
Naphtha	20	"
Benzine	18	"

This is an excellent cleanser that will not injure the finest fabrics.

GOLD COLOURING TIN

Shellac	5	oz.
Turmeric	2	"
Gamboge	2	"
Dragon's blood	4	dr.
Methylated spirit	3	pints.

Dissolve the ingredients in methylated spirit and apply the lacquer on the articles which should be thoroughly cleaned with soft soap and hot water and warmed.

TAMBUL BIHAR

Liquorice powder	24	parts.
Pollen of keora	24	"
Seeds of cardamom major	3	"
Seeds of cardamom minor	3	"
Cloves	3	"
Cinnamon	3	"
Rose water		q.s.

Mix the above ingredients together and macerate in a stone mortar with requisite quantity of rose water. Then add finely pulverised saffron 3 parts.

WHITENING TENNIS BALLS

Light carbonate of magnesia	3	oz.
Benzol	½	fl. oz.
Liquid paraffin	½	"
Tragacanth	40	gr.
Methylated spirit	½	fl. oz.
Water	2	pints.

Mix the benzol, liquid paraffin, tragacanth and spirit. Add to this, all at once the mixture of magnesia and water. Shake well. Clean the balls thoroughly and dip in the mixture. Lastly, dry the balls in a warm place and shake together.

CELLULOID TOYS FROM WASTE FILMS

Celluloid	100	parts.
Acetone	100	"
Magnesia	25	"
Levigated chalk	5	"
Glycerine	22	parts.
Ether	10	"
Methylated spirit	15	"

The mass runs easily into the moulds and sets rapidly, so that, by drying at 20°C, the article may be turned out completely in 3 hours.

PALM GUR MAKING

Palm gur is delicious, and it can be easily used as a sweetening agent in place of cane gur. Palm gur is prepared from sweet and fresh Neera and not from toddy.

There are four varieties of sugar yielding palms in India: Palmyra, date, coconut and sago palms.

The technique of tapping palms and making of gur is very easy; any person of ordinary intelligence can master this art within six months. The palmyra, coconut and sago palms throw out spathe when they are in florescence These spathes are tapped, massaged and bound in order to accelerate the flow of juice. The upper most portion of the spathes is sliced off with a sharp knife and the exudation of the juice begins. This juice as called Neera is then collected into an earthen pot suspended to the spathe. In order that the juice may not get fermented, a small quantity of lime is deposited in the pot. The lime is taken out before Neera is converted into jaggery. Cleanliness of tools, pots and the tapped portion is an important factor in the process.

Neera is then collected and heated and superphosphate is added to it; after the lime is deposited at the bottom, Neera is decanted into the pan for evaporation.

It is necessary to remove the scum during the process of boiling. So also the walls of the pan have to be cleared of scum, so that the resultant product may not be charred or turned bitter.

When heated to 116°C. to 118°C. Neera is converted into jaggery. Striking the pan is done at this juncture and the pan is removed from the furnace. The viscous mass is slowly stirred so that the hot pan may not cause the product to be charred at the bottom. The jaggery is then poured into suitable moulds and hard blocks of gur are ready for use after some time.

Unlike other palms, the Date palm calls for a different method of tapping. When the tree is 8 to 10 years old, the growing tender portion of the topmost trunk just below the place of shooting out new leaves is scraped with sharp instrument after chopping off the lower leaves. This scraping is an artful operation. Its object is simply to open the pores of the interior skin; hence, a very thin layer has to be scraped every time. From these pores oozes the juice. Subsequent process is same as the above.

In order to protect the gur from getting moist during the rainy season it is stored in the paddy stack or in cotton seeds or kept in a warm place in the house.

—TAD GUR KHABAR.

—IN THE FIELD OF INVENTION

PORTABLE SMALL VULCANIZATION APPARATUS

A remarkable invention has been brought toward by the Erich Schumm Works. It is a portable and simple vulcanization apparatus heated like all ESBIT instruments with the well-known dry fuel ESBIT, safe in use and not harmful to health. The new apparatus being quite independent from gas and electricity guarantees irreproachable hot vulcanization of all motor car inner tubes. It is ideal for workshops and garages, for motor-pools as well as for every individual motorist, for it is easy to handle and low in price.

An exciting novelty is the fact that even fire brigade hoses can be vulcanized by means of special tissue-lined rubber batches which means reducing expenses for every fire-brigade and community and having the hoses always ready for action to do the running vulcanization repair works themselves.

Considering all these advantages there is no doubt that the invention will make its way round the world.

NEW INSULATING TAPE

With the introduction of thermoplastic materials on the basis of synthetic polymerisation, especially of hoses made from polyvinechlorite, for the manufacturing of insulated cables and hoses instead of rubber, the demand rose for insulating tapes from the same material for insulating winding, bandaging etc. of high-and-low tension cables, distributing wires, armatures dynamo-coils of electromotors and transformers and last not least for the repairing of current-carrying parts.

These insulating tapes with a dielectric strength of nearly 20 kw per one mm and an insulating resistance of nearly 500 Megohm/meters offer the advantage that they can be laid on very closely in the case of winding, especially when oblique winding is wanted, due to their excellent flexibility and elasticity. They had, however, to be glued at their ends of soldered by means of a soldering iron or hot knife.

Recently it became possible to supply these tapes with a durable adhesive layer which does not dry up and which in practice can be used like usual insulating tapes made from textiles. In comparison to them they have the great advantage of being indifferent towards oil, benzincarbohydrates, lyes and acids. They are moistproof, absolutely durable and almost refractory.

—Mediator of the World Trade

ELECTRIC EYE

A new type of "Electric Eye", much simpler smaller and sturdier than the present photo-electric cell and capable of performing most of the functions of an ordinary vacuum tube is being perfected at the Bell Telephone Laboratories (J. Franklin Inst., 1950, 249, 516). Because of their smaller size and long life, the photo-transitors should find many applications where it is not practical to use the present photo-electric devices.

The apparatus consists of a small cylinder of the size of 0.22 calibre rifle cartridge containing a piece of germanium. In a small dimple ground into one side of the germanium disc rests the tip of a wire (the collector). At this point the disc is only 3/1000" thick. Light focussed on the opposite, undimpled side of the disc can control the flow of current in the wire, thus making a control device similar in function to a photo-electric cell.

The photo-transitor has a high power output for a photo-electric device, in some cases enough to operate a switch directly without preliminary amplification and gives good response to a rapidly fluctuating light source. It is sensitive to light given off by ordinary incandescent light bulbs and is well suited to operate with these with good fidelity. Another important property of the device is its low impedance.

X-RAY INSPECTION

X-ray equipments developed by Philips Electrical, Ltd., Century House, Shaftesbury-avenue, London, W.C.2. are being used in a number of industries for the visual inspection of food and other consumer products for detecting foreign inclusions, such as ferrous and non-ferrous metals, rubber, stones and glass. Pieces of glass no more than ⅛ in. diameter can, it is said, be detected through 5 in. of flour, 6 in. of lard 4 in. of sugar and 6 in. of bread. The type of installation is dependent upon the nature and shape of the commodity to be examined the principal consideration being to project the largest area of the commodity on to the fluorescent screen. In a typical installation the product to be examined is conveyed through a dark booth where it is observed by the inspector as it passes over the X-ray system. Should any impurities be revealed, the inspector, by operating a trigger mechanism, rejects the contaminated product. In this way the speed of the examination can be made to keep pace with the production rate. The equipment is simple and safe to operate and may be used with either conveyor or tray systems of inspection.

—The Machinery Market and The Machinery & Engineering Materials Gazette

CRAKLE FINISHES

1891 S.S.R.S., Nagpur—Wises to know formulas of Crackle Finishes.

Very beautiful marble-like effects can be produced in contrasting colours by applying as an undercoat one which cracks on drying and spraying over this a clear fixature lacquer. The undercoat is over-pigmented and underbound and usually contains excess of diluents and little plasticiser. The fixature lacquer is a hard, though, protective lacquer. The size of the crack is governed by the spraying operator. Typical examples are appended:—

Clear Base (Undercoat)

Stock 4-sec. cotton	6	per cent.
"X12" petrol	40	„ „
"Cellosolve"	25	„ „
Diacetone alcohol	17	„ „
Butyl phthalate	12	„ „

Undercoat

BLACK

Clear base	93	per cent.
Barytes	4	„ „
Carbon black	3	„ „

WHITE

Clear base	94	per cent.
Barytes	4½	„ „
Lithopone	1½	„ „

YELLOW

Clear base	93	per cent.
Barytes	3	„ „
Chrome yellow	4	„ „

DEEP BLUE

Clear base	93	per cent.
Barytes	3	„ „
Chinese blue	4	„ „

FIXATURE LACQUER

Make a mixture of 4-sec. cotton in butanol 30 per cent.; amyl acetate 47 per cent.; and ethyl acetate 23 per cent.

Take above mixture	40	parts.
"X10" petrol	45	„
Tricresyl phosphate	1	„
Methylated spirit	10	„

"WRINKLE" FINISHES

True "wrinkle" finishes are essentially based on the wrinkle of polymerised wood oil when this dries to a film, but they have to be admixed with bitumen and heat-hardening resins to obtain the necessary toughness, hardness and durability, and whilst they will air-dry, they take a long time to harden in the air, and the character of the "wrinkle" and its shape and size and the toughness of the dried film are governed by subsequent stoving.

The finishes may be pigmented to any desired shade and they make a very pleasing, yet durable finish for all sorts of articles that have to withstand hard wear, and hence are coming into greater use for those goods which rely partly on sales appeal for their quick sale, such as cameras, various scientific instruments, wireless accessories, cinematographic apparatus, etc.

Clear "wrinkle" lacquer applied to bright metal objects produces a pleasing finish unobtainable by other methods. The application is by spray, brushing being unsatisfactory, followed at once by a take in an oven at 150 to 200F. for a quarter to a half an hour, depending on the manufacture.

The mechanism of "wrinkling" depends on the formation of a surface film of oxidised processed tung oil, and subsequent swelling due to the absorption of the semi-fluid enamel underneath this hardened film, subsequent expansion causing the "wrinkle". A foul stove containing a deficiency of oxygen will not produce regular "wrinkling" effect. Also, if the thickness of the film sprayed on varies, the "wrinkling" effect will also vary, so that reasonable skill in spraying large areas is necessary. Admirable spray and stoving plants are now available, and with reasonable care uniform "wrinkle finishing" is practical.

A typical "wrinkle lacquer" recipe is attached:—

Raw wood oil	75	p.c.
Drop black in turpentine	8	„
White spirit	12	„
Bitumen or coumarone	5	„
Lead solignum as required		A trace

REFINING COTTON SEED OIL

2035 C.M.M., Indore City—Wishes to know a process of refining cotton seed oil.

The principle underlying in the refining of cottonseed oil is that the oil is first passed through a filter press to remove mucilage, etc. and then it is allowed to run into a storage tank. From this it is passed by gravity into the refining tank, where it is heated by steam until it reaches a temperature of about 140°F. Thereafter the oil is violently agitated by means of compressed air, the temperature meanwhile, being kept as near 140°F. as possible. During the agitation caustic soda solution is run into the tank. As the solution is heavier than oil it tends to sink to the bottom, so care should be taken if intimate contact with the oil is desired. This can be done successfully by distributing the solution evenly over the surface of the oil and by vigorous agitation. When it has been ascertained by testing that sufficient caustic soda has been added to neutralise the free fatty acid, the charge is allowed to stand and settle.

After settling, which usually takes about 12 hours for complete sedimentation, the mucilage and other residue are drawn off into a pitch-lined tank and the clear oil is passed into washing tank where it is treated with hot water so as to remove all traces of caustic soda. The

process may be repeated, if necessary. After this the last traces of moisture may be removed by boiling the oil in vacuum pans.

ANNEALING IRON

The term annealing, when applied to alloys, differs somewhat from its general meaning. The alloys undergo no phase transformations upon cooling from softening temperatures and, therefore, cooling may and should be done as rapidly as possible. The purposes of annealing are to relieve strains set up in previous cold rolling or forming operations and to produce a homogenous, completely austeritic condition in which the metal possesses a maximum softness and corrosion resistance.

Annealing is done by heating to at least 1850°F. and cooling rapidly. The time required at this temperature is dependent upon the mass of the metal. For light sheet sections, 16 gauge and thinner, three to five minutes will suffice. Heavier sections, upto one-half inch thick will require. Proportionately, up to one-half hour at this temperature. By increasing the temperature 1910° to 2000°F., the annealing time may be lessened and the metal will attain its maximum softness and greatest ductility upon rapid cooling.

Air cooling is usually sufficient for stock 14 gauge and lighter. An air blast or, preferably, a water spray or quench is desirable for heavier sections.

The chromium-nickel steels, with the exception of U.S.S. Stabilized 18-8, should not be allowed to remain at temperatures between 1000° and 1500°F., nor should they be allowed to cool slowly through this range, as this treatment lowers corrosion resistance.

Flame contact with the steel should be avoided to prevent heavy scaling and burning of the surface. For this reason furnaces of a muffle, semi-muffle or electric type are a distinct advantage. A blacksmith forge in which appreciable carburization may occur should never be used.

Before annealing, the surfaces of the metal should be thoroughly cleaned of all foreign materials such as dirt, oil, grease or other lubricants. Otherwise there will be carburization, pitting and non-uniformity of the surface after pickling. Even finger prints on the unannealed surface, if not removed before annealing, may be quite apparent after pickling.

HAIR OIL PERFUMES

2039 B.C.P.W., Patiala—Wishes to have good recipes of hair oil perfumes.

The following hair oil perfume compounds are recommended for preparation of scented hair oils. The oil basis must be refined prior to addition of the scent.

I.

Otto of rose	½ dr.
Oil of rose-geranium	2 „
Oil of bergamot	2 „
Oil of lemon	2 „
Oil of cassia	10 mins.

Procedure:—Mix and keep aside in a corked bottle to mature. 2 dr. of the above is sufficient to perfume 24 oz. of refined oil.

II.

Oil of jasmine	10 dr.
Oil of bergamot	7 „
Oil of clove	15 mins.
Oil of lemon	8 „
Oil of rosemary	5 „
Oil of neroli	20 „
Oil of thyme	1 min.

Procedure:—Mix as above. 3 dr. of the mixture will perfume 24 oz. of refined sesame groundnut and other oils.

III.

Jasmine oil (floral)	10 dr.
Oil of cloves	10 mins.
Oil of bergamot	½ dr.
Rose oil	5 mins.
Orange oil	20 „
Thyme oil	1 min.

Procedure:—Mix in the order given and keep aside for a week to blend. Basis may be, benzoated til oil. The above will be sufficient for 10 oz. refined oil.

IV.

Rose oil	4 fl.oz.
Musk ambrette	1 oz.
Sandal oil	1 fl.oz.

Procedure:—Mix as above. This will be suitable for 30 seers of coconut oil.

NARCISSUS COMPOUND SCENT

Para Cresyl Phenylacetate	70 parts.
Para Cresyl Iso-butyrate	10 „
Terpineol	200 „
Linalol	100 „
Geraniol	100 „
Hydroxy-Citronellol	200 „
Iso-eugenol	50 „
Ylang Ylang	30 „
Petitgrain oil	50 „
Phenylethyl cinnamate	20 „
Phenyl acetaldehyde	40 „
Indole	10 „
Heliotropin	100 „

Mix by shaking and keep aside for two weeks to mature.

FRENCH POLISH

2093 R.T.C., Kumbakonam—Wants a good formula of French polish.

So-called French polish is made by dissolving 1 part of bleached or orange shellac in 15 parts of alcohol, the solution being allowed to stand and the clear portion then being decanted. The varnish may be coloured by materials which are soluble in alcohol.

For red, use 1 part of eosin to 49 parts of bleached shellac solution. For blue use 1 part of aniline blue to 24 parts of the bleached shellac solution, as the orange shellac solution would impart a greenish cast. For green use 1 part of aniline green (brilliant green) to 49 parts of the orange shellac solution. For yellow

use either 2 parts of extract of turmeric or 1 part of gamboge to 24 parts of the solution, or 1 part of aniline yellow to 49 parts of the solution. For golden yellow, use 2 parts of gamboge, add 1 part of dragon's blood to 47 parts of the orange shellac solution. The gamboge and dragon's blood should be dissolved first in a little alcohol.

BORDHARALT'S HERB SOAP

2070 A.V.M., Hazaribagh Road—Wants to have a good formula of herb soap and also ointment.

Olive oil soap	30	lbs.
Palm oil soap	20	,,
Dextrine	2	,,
Perfume with rosemary oil	2	oz.
Lavender oil	1½	,,
Thyme oil	1½	,,
Sage oil	1	,,
Magnolia oil	1	,,
Peppermint oil	1	,,
Colour blue.		

Melt the soaps and add the dextrine. Then remove from the source of wheat and spray the essential oil mixture and lastly the colour dissolved in a little water. Mix thoroughly and put in frame. When set cut into blocks and stamp.

ARTIFICIAL WOOD

2115 G.M., Bara Banki—Desires to know a process of making artificial wood from saw dust.

Many forms of artificial wood are formed by binding sawdust with ox-blood, starch, glue, flour, etc. and pressing. Several types of boards for building purposes were investigated to in England during the war. One of the most promising methods seems to be to give the saw dust a preliminary treatment with plaster of paris and then mix with cement. Such board stand mailing.

Very fine boards can be made from 50 per cent. saw dust and sorel cement. They are cast on glass, and so have a smooth polished surface. Very pretty effects can be obtained by colouring the sawdust particles such boards should prove a good substitute for asbestos boards, and could also be used to replace ply wood in furniture making, and especially in office fittings.

BLEACHING SHELLAC

2144 O.P., Delhi—Wants to know the process of bleaching shellac.

A white or bleachtd shellac is prepared in several ways. One method is to boil ordinary shellac in a weak solution of carbonate of potash until it is dissolved, then to pass chlorine gas through the solution. When the lac is thrown down free from colour the resin is collected, washed with warm water, melted over water, and by working with the hands, made into the form of more or less twisted cylindrical pieces having a marked fibrous structure.

Another method which is followed is to treat the shellac with a weak solution of potash at such a temperature that it is softened, and then to work the lac with the hands until it has lost its colour and has acquired the fibrous appearance usual with bleached shellac.

It is mainly used in making white varnishes. Its properties are the same as the ordinary shellac; but it gradually deteriorates, becoming very brittle and insoluble in alcohol and in alkaline solutions.

WATER COLOUR CAKES

2226 B.S., Kanpur—Wants to have recipes of making water colour cakes.

Artist water colours may be prepared by grinding the respective pigments, previously reduced to powder, into a smooth paste with equal weights of isinglass size and thin gum water. The paste is then compressed into squares as tightly as possible and dried with a very simple heat. Old crumbling cake colours should be powdered very finely in a mortar, sifted through fine muslin and ground up as above, the gum water being omitted. The powders, rubbed up with honey to the consistency of cream, constitute moist colours.

CHALK CRAYONS

Precipitated chalk	8	oz.
China clay	5½	,,
Oleic acid	6¾	,,
Caustic soda	1	,,
Water		q.s.

Mix the oleic acid and caustic soda, after warming them separately. Then add to the clay and chalk mixed with enough water to bring to about the consistency of putty. The mixing must be done in a standard type dough mixer or other clay mixing equipment. Then cast into sticks of the usual size and bake over moderate heat.

FACE POWDER

2241 T.C.A.R.C., Madura—Wants to have a good recipe of face powder.

Boric arid	90	parts.
Fuller's earth	100	,,
Zinc oxide	200	,,
Corn starch	100	,,
Orris root powder	200	,,
Lycopodium powder	200	,,
French chalk	100	,,
Rose oil	1	part.
Bergamot oil	6	parts.
Neroli oil	2	,,
Heliotropin	1	part.

Mix all the ingredients together and pass several times through fine sieve to ensure thorough mixing. Finally put in tins or packets as desired.

SYRUP GLYCEROPHOSPHATES

2288 N.K.S., Darbhanga—Wishes to have a formula of preparing syrup glycerophosphates.

Calcium glycerophosphate	22.9	grms.
Magnesium glycerophosphate	11.4	"
Iron glycerophosphate	5.7	"
Solution of potassium glycerophosphate	22.9	"
Solution of sodium glycerophosphate	22.9	"
Potassium citrate	11.4	"
Glycerophosphoric acid	20.8	"
Caffeine	5.7	"
Strychnine	0.2	"
Glycerin	200.0	c.c.
Sucrose	400.0	grms.
Solution of Bordeaux B.	31.2	c.c.
Chloroform	2.1	"
Alcohol (90 p.c.)	4.2	"
Distilled water to make	1000	"

Dissolve the potassium citrate in 350 c.c. of distilled water, add the solutions of potassium glycerophosphate and sodium glycerophosphate and dissolve the other glycerophosphates in the solution. Next add the glycerine, the strychnine dissolved in the other glycerophosphoric acid, and the caffeine dissolved in 50 c.c. (11 oz.) of hot distilled water.

Filter and dissolve the sucrose in the filtrate without the aid of heat. Add the chloroform dissolved in the alcohol, the solution of Bordeaux B. and sufficient distilled water to produce the required volume.

DIAZO TYPE PRINTING PROCESS.

A majority of aromatic amino compounds form diazo compounds by treating an acid solution of the amine with the necessary quantity of nitrous acid, usually generated by adding sodium nitrite to the acid solution. The amino compound is converted into a diazonium salt.

The azo dyes are produced from diazonium salts by the addition of an aromatic amine in alkaline solution which is known as the 'Coupling Component'.

The diazonium salts are normally unstable and have to be prepared at temperatures below 10°C; they are usually colourless. The azo dyes, however, are relatively stable and yield a very wide range of colours. Where a sensitive diazonium salt is exposed to light in the presence of water, nitrogen is given off and the diazo group is replaced by a hydroxy group, the new compound being no longer capable of reacting with a coupling compound to form a azo dye. Thus, if the surface of a paper is treated with a diazo compound and is exposed to light behind a tracing, on treating with an alkaline solution of a coupling component an azo dye is formed when there has been no light action and a positive image of the tracing results. This produce is modified thus, the diazo compound and coupling component may be coated together, but reaction prevented by the addition of an organic acid. Exposure breaks down the diazo compound and coupling is completed in the unexposed regions by bath in weak alkali, or by exposure to ammonia vapour. The permanence of the dye image to light and also its colour may be modified by the addition of metallic salts to the sensitising bath.

SPREADER-STICKER AGRICULTURAL SPRAYS

Casein	½	lb.
Wheat flour	2	lbs.
Spray mixture	100	gals.

Mix.

Spray mixture means that the stated quantities of casein and flour are added to 100 gallons of Bordeaux mixture fungicide spray to provide sticking and spreading qualities.

BORDEAUX MIXTURE

Copper Sulphate	32	tolas.
Quicklime	32	"
Water	8	gallons.

Copper sulphate is to be dissolved in half the water in an earthen or wooden vat by suspending in a gunny sacking just immersed; stone lime should be slowly slaked in another vessel, by adding a quantity of water little by little until the bubbling ceases, after which the rest of the water is added. The two solutions then are mixed together by pouring one into the other and sprayed. But before this casein and wheat flour are also incorporated.

CAMPHOR TABLETS

To produce camphor tablets take camphor crystals and break them into coarse powder. Then moisten the powder with a little spirit and compress into blocks of required sizes. Keep these blocks into air to allow the spirit to vaporise. Then keep the blocks into airtight bottles.

—READER'S BUSINESS PROBLEMS

[Reader's business problems will be discussed in these pages. We invite the reader to write us his difficulties. As the department is in charge of an experienced businessman who is specially adept in dealing with such problems and to whom experiences of a large number of successful businessmen are available, his replies will lead the enquirer to a successful career. These replies will be published in the paper only and cannot be communicated by post.]

IMPROVING ICE BUSINESS

2912 S.M.I.F., Gaya—Writes, "I own an ice factory in my place, there is already one existing and another is going to be constructed that will commence manufacture in the ensuing summer. I cannot make any profit out of it. Please advise me so that I may be successful in my business".

It is very difficult for new businessman to stand against competition of an old existing firm. I advise you to supply ice at less than the existing rates. If quality of your ice is not inferior to other articles sold in the market there is no reason why you will not be able to capture the entire market within a short time. I also ask to approach fish exporters, if there be any, who will require ice regularly in large quantity. Ice cream manufacturers may also be approached because they also require ice for preventing melting of icecream when selling in vans. You may also see the hotel keepers and various clubs and convince them to stock your goods. You should also distribute printed handbills announcing reduced rates and superiority of quality.

STARTING A CAREER WITH SMALL CAPITAL

2869 R., Agra—Writes, "I am keen after starting some industry but I have neither capital nor experience. So please advise me accordingly".

It is very difficult on our part to suggest any kind of industry which can be started without any capital. You may however start some mail order business which can be started with small capital and can be worked in leisure time. This business will not yield you any profit in the first two years. In course of these two years you will get experiences that will be of much help in successive years of your business career. The first attempt that you should make is in marketing some cheap novelty. The large houses do not usually handle such things. So there is not much danger of coming in contact with this class. The most dangerous competition will in probability come from your rival, the small mail order class, the number of which is very limited. But if you are very keen upon starting any kind of small industry you may take up manufacture of ink. Process of manufacturing all sorts of ink will be found in Manufacture of Ink, published from this office price Rs. 3-7 including postage.

CORK PRODUCTION AND MANUFACTURE

2317 B.K.R., Jubbulpore—Wants to be enlightened on cork production and manufacture.

The cork trees (Quercus Suber) grows in Portugal, Spain, Corsica, Sardinia, Tunis, Algeria and Morocco. It is generally recognised that the best quality emanates from Portugal, which it is estimated produces 60 per cent. of the world's total. The tree grows best in poor soil, especially of a sandy nature; when the soil is richer or the trees grow near rivers or streams, the trees themselves flourish but the quality of the cork is inferior. The inner bark contains tannin, and the timber gives the best quality charcoal.

When the young tree is from 25 to 30 years old it is usual to strip the virgin cork from the trunk, the following strip nine years later known as 'secundeira' is usually cracky and consequently unsuitable for export, the best cork is obtained from trees of from 50 to 100 years of age.

Raw cork is stripped from the trees during the months of June, July and August, and occasionally as late as September. After stripping, the cork is baled and forwarded to the factories near the large cities. Manufacturing begins in November, the cork being scraped to take off the heavy crust, and is then boiled and piled. When the piles are opened, the cork is separated according to thickness, and the labour continues through its various stages, it is then either packed in bales for export, or manufactured into cork products.

The purchase of the raw material is undoubtedly the most important operation the manufacturer has to make, as, with piles of cork as it comes from the trees, frequently 100 yards long, 10 yards wide, and piled to a height of 3 yards, it is no easy matter to compute the average size and quality, very expert knowledge being required to safeguard against unproductive purchases. Light plays an important part in the appearance of cork, and purchasers are required to use considerable judgment when making their purchases, as appearances vary considerably according to the time of the day.

—BRIEF QUERIES AND REPLIES

Questions of any kind within the scope of Industry are invited. Enquiries or replies from our experts will be published free of charge in serial order. Questions are replied by post on receipt of As. 8 stamps for each question. Subscribers outside India are requested to Send two International Reply coupons for each question. In order to facilitate the work of Editor's Department and to help prompt action the readers are requested to send enquiries in separate letters.

2406 G.N.M., Bilaspur—Process of manufacturing ice candy will appear in due course. Milk powder may be had of A. R. Khan & Co., 61, Colootola Street; Mazdas Ltd., 7-1, Lindsay Street and Jubilee Stores, 35, Park Street; all of Calcutta.

2407 K.M., Cuttack—You may consult Vegetable Oil Industry published from this office. price Rs. 3-7 including postage.

2408 D.K.B., Gauhati—You may start a perfumery business with Rs. 5,000 on a small scale. It will be advisable for you to undergo some sort of practical training. For practical training you may communicate with the Chemical Director, Industrial Research Laboratory, 22, R. G. Kar Road, Calcutta.

2409 A.C., Aligarh—We have no book dealing with the manufacture of enamelled board and nameplate. You may however enquire of Thacker Spink & Co. (1933), Ltd., 3, Esplanade East and W. Newman & Co., Ltd., 3 & 4, Old Court House Street; both of Calcutta.

2410 P.M.A., Ambur—In manufacturing glue you should use potassium bicarbonate or pearl-ash.

2411 S.D., Calcutta—Following is a list of poultry farms.—Kumaon Poultry Farm, Gathia, Nainital; U. P. Poultry Association, Lucknow; Eastern Livestock and Poultry Farm, Jhargram, B. N. Ry. and Bengal Poultry Dairy & Agriculture Ltd., Belgharia, 24-Parganas.

2412 S.V.S., Salem—For machine required for making ice candy sticks from bamboos enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

2413 H.P., Nagpur—Herlton may be had of Calcutta Chemical Co., Ltd., 10, Bonfield Lane, Calcutta, and Butto Kristo Paul & Co., Ltd., 1 & 3, Bonfield Lane, Calcutta.

2414 H.S.F., Dharmsala—Process of treating wooden separators will appear in due course.

2415 A.M.A., Khamgaon—Canning products may be had of S. Mitra & Co., 30, Bentinck Street, Calcutta. For books on electroplating enquire of Thacker Spink & Co. (1933), Ltd., 3, Esplanade East, Calcutta.

2416 I.M.C., Delhi—Reply to your enquiry has been sent by post.

2417 N.B.R., Khariar Road—For engines of required brand enquire of Francis Klein & Co., Ltd., 1, Royal Exchange Place and Balmer Lawrie & Co., Ltd., 103, Netaji Subhas Road; both of Calcutta.

2418 M.C., Meerut—For radio of different types enquire of the following firms:—Phillips Electrical Co. (India), Ltd., 2, Heysham Road, Calcutta; N. B. Sen & Bros., 11, Esplanade East, Calcutta; K. C. Dey & Sons, 161-1, Harrison Road, Calcutta and General Electric Co. (India), Ltd., Magnet House, Chittaranjan Avenue, Calcutta.

2428 C.P.A., Delhi—Following is a list of booksellers:—Das Gupta & Co., 54/3, College Street; Book of the World, 21, Old Court House Street; Book Co. Ltd., 4/3B, College Square and Kamala Book Depot Ltd., 15, College Square; all of Calcutta. Following is a list of stationers:— D. N. Bhattacherjee & Sons, 31 & 34, Canning Street; City Stationery Mart, 14/2, Old China Bazar Street and Calcutta Stationery Stores, 130A, Old China Bazar Street; all of Calcutta. Complete list of booksellers and stationers will be found in Industry Year Book & Directory.

2429 G.G.P., Chikodi Road—For the machines enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. You may refer your query to the Deputy Controller of Iron and Steel, Bombay.

2430 N.I., Lahore—For groundnut shelling machine enquire of Batliboi & Co., Forbes Street, Fort, Bombay.

2431 S.C.B., Khardah—Aniline dyes may be had of Champalal Agarwalla, 45, Armenian Street, Calcutta; Fazlehussein & Bros., 44, Armenian Street, Calcutta; Dolatram Kashiram & Co., Khan Mohamed Kashiram Bldg., Thakurdwar Road, Bombay 2 and Nanavati & Co. Ltd., 16, Apollo Street, Fort, Bombay.

2432 B.P.W., Kanpur—Reply to your letter appeared under No. 2251 in November issue of Industry.

2433 Y.P.W.C., Colombo—Following is a list of ayurvedic medicine dealers:—Dacca Ayurvediya Pharmacy Ltd., 200-1, Rashbehari Avenue, Ballygunge; Kalpataru Ayurvedic Works, Kalpataru Palace, 233, Chittaranjan Avenue North; Kaviraj N. N. Sen & Co. Ltd., 18-1, Lower Chitpur Road and P. C. Daw & Co., 1, Mechua Bazar Street; all of Calcutta. For taking agency you should communicate direct with the firms.

2439 H.S., Jullundur City—It is not possible to colour nickel plated articles. You should not use coaltar in place of asphaltum.

2440 N.R.E.C., Karaikudi—For pin making machines enquire of Baird Machinery Co., Bridgeport, Connecticut, U.S.A.

2442 V.H., Delhi—Formulas of artificial tomato sauce and artificial vinegar will appear in due course.

2443 K.K., Hospet—Following is a list of photo block makers: Ahoova Photo Engraving Co., 41-15, Medows Street, Fort, Bombay; Sun Process Works, Ltd., 8, Swadeshi Mills Compound, Tata Road, Bombay; Hindu Process Studio, Kasturi Bldgs., Mount Road, Madras, and Ravi Process, 1/156, Broadway, G. T., Madras.

2444 K.C.C., Calcutta—You may consult Plastic Industry published from this office, price Re. 1/-. Plastic machine may be had of Francis Klein & Co. Ltd., 1, Royal Exchange Place, and Small Machineries Manufacturing Co., 22, R. G. Kar Road; both of Calcutta. There is no arrangement for practical training on plastic industry.

2445 S.N., Delhi—Rubber working machine may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta, and Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta.

2446 A.H.N., Dehri-on-Sone—You may consult Manufacture of Soap published from this office, price Rs. 4/7/- including postage. Soap making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. Soap making materials may be had of Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane, Calcutta. No special license is reuqired for manufacturing soap.

2447 B.B.J., Freetown—For talisman enquire of All India Astrological & Astronomical Society, 105, Grey Street, Calcutta.

2448 P.B.P., Bangalore—We do not understand your requirement. For candy plant enquire of Small Machineries Mfg. Co., 22, R. G. Kar Road, and Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension; both of Calcutta.

2449 R.J.P.C., Ahmednagar—Process of manufacturing corn flour, curd, etc. will appear in due course.

2450 T.K.S.C., Salem—For coriander essence enquire of Paradise Perfumery House, 7, Colootola Street, Calcutta.

2451 A.K.G., Deoghar—You may start soap manufacture, lozenge manufacture and plastic industry with Rs. 2,000/- each. You may also consult Manufacture of Soap, published from this office, price Rs. 4/7/- and Manufacture of Confectionery, price Rs. 4/7/- including postage.

2457 A.T.C.I., New Delhi—Process of preserving honey will appear in due course.

2458 M.C.I., Jullundur City—Process of polishing cycle frames will appear in due course.

2459 D.C., Bilga—For ferrous bromide write to Photographic Stores & Agency Co. Ltd., 154, Dharamtala Street, Calcutta.

2460 D.V.R., Mamidipalle—You should consult ordinary and veterinary physicians for prescription for human and animal ailment. Address of Lister Antiseptics & Dressings Co. (1928) Ltd., is 12, Umakanta Sen Street, Cossipore, Calcutta. Other addresses you require are not available. For removing reddish coating of groundnuts you should use decorticating machine. You may refer your enquiry regarding plant to Botanical Survey of India, Indian Museum, 1, Sudder Street, Calcutta. There is no such Government organisation.

2461 K.K.M., Rajahmundry—Your enquiry appears under Trade Enquiry Columns.

2462 T.S.V.S., Raipur—Reply to your query appeared in November 1950 issue under No. 2096.

2463 N.K.W., Ajmer—Formula of cementing solution will appear in due course.

2464 G.L.S., Amritsar—Process of anodising aluminium will appear in due course.

2465 T.R.K.A., Travancore—Address of P. C. Sorcar is Indrajal, 12/3/A, Jamir Lane, Calcutta 19. You may refer your enquiry regarding magic to Magician Sorcar.

2485 P.S.F., Veraval—Process of manufacturing glycerine from waste lye will appear in due course.

2486 S.T.K., Fiji—We have no book on board manufacture. You may however write to Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, and W. Newman & Co. Ltd., 3 & 4, Old Court Street; both of Calcutta for a book on board manufacture.

2488 H.N.V., Gwalior—For training on business and industrial organisation write to Indian Merchants' Chamber, Lalji Naranji Memorial Indian Merchants' Chamber Bldg., Church Gate Street, Fort, Bombay, and Sydenham College of Commerce and Economics, Bombay.

2489 P.M.B., Suratgarh—For generators enquire of General Electric Co. (India) Ltd., Magnet House, Chittaranjan Avenue, Calcutta and Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta.

2490 H.B.H.C., Bombay—Copper and zinc may be had of Balmer Lawrie & Co. Ltd., 103, Clive Street and William Jacks & Co., 10, Netaji Subhas Road; both of Calcutta. For platinum enquire of Hamilton & Co. Ltd., 8, Old Court House Street, Calcutta.

2491 K.N.S., Sanand—For triturating machine you may enquire of Prabartak Commercial Corporation Ltd., 61, Bow Bazar Street, Calcutta.

2492 N.S., Shimoga—Address of Mazda's Ltd., is 7/1, Lindsay Street, Calcutta.

2493 B.C., New Delhi—Match making machine may be had of Standard Machinery Co., 67B, Netaji Subhas Road and Harima Engineering Works Ltd., 69/1, Belgachia Road; both of Calcutta.

2494 C.S., Trichur—We have no book on pyrotechny except Home Industries which you have already got. We have no book on aluminium powder, magnesium powder and steel powder manufacture.

2495 J.S.C., Narsaraopet—Dyes and chemicals required for ink manufacture may be had of Fuzlehussein & Bros., 44, Armenian Street and Champalal Agarwala, 45, Armenian Street; both of Calcutta.

2496 C.S., Ahmedgarh—Printing on metal is done by lithoprinting process. Process of wrinklo finishing with paints appears elsewhere in this issue.

2497 B.S.M., Hubli—You may use 4 to 5 p.c. castor oil and not more than 2 p.c. apraffin in making soap. It is generally used to increase detergent properties of soap.

2498 T.N.A., Sitapur—Following is a process of manufacturing vinegar from sugarcane juice:—Take 10 seers of sugarcane juice in an earthenware vessel and bring to a boil. Remove when it bubbles up and strain when cool. Put it into an earthenware vessel. Cover the mouth and bury the same in the ground. The hole should be dug big enough to hide the vessel up to the neck. After some days a film will appear, remove it and cover again. Repeat in this way so long as films are formed. Lastly when this ceases, strain and bottle. Detailed information regarding vinegar manufacture will be found in Home Industries published from this office, price Rs. 3/7/- including postage.

2499 K.A.K., Bangalore—Metal buttons may be had of Deccan Button Manufacturing Works, 49, Bhandari Street, Bombay 4 and India Button Works, 152, Sandhurst Road, Bombay. Button making machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

2500 S.C.S., Kanpur—Address of Indian Small Industries is not known.

2501 S.N.B., Allahabad—It is not possible to manufacture hair dyeing oil by any other process than the one already supplied to you.

2502 M.A.C., Allahabad—You may buy ordinary thin pieces of cardboard and make hole in them. Cardboard with required holes will not be available in the market.

2514 S.D., Calcutta—Process of manufacturing tin oxide, aluminium oxide, etc. will appear in due lourse.

2517 I.S.M., Jullundur City—For transfer label write to Signograph Co., Barnagore, Calcutta, and R. G. Pal & Co., 110/2, Grey Street, Calcutta.

2520 B.B.O., Sasaram—Addresses of newspapers and booksellers and publishers will be found in Industry Year Book and Directory, price Rs. 16/4/- including postage. For dry fruits enquire of Apple Walnut Co., Baramula, Kashmir; Imperial Fruit Agency, Baramula, Kashmir; Leading Fruit Co., Srinagar, Kashmir, and Newman's Fruit Mart, Srinagar, Kashmir.

2521 B.C.R., Burdwan—For hose pipe write to M. Berfy & Co., 12, Netaji Subhas Road, Calcutta, and Keymer Bagshwe & Co. Ltd., 22, Strand Road, Calcutta.

2524 S.P., Shivpuri—Button making machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. It is not possible to start a type foundry with Rs. 2,000/- only. For type casting machine enquire of John Dickinson & Co., 6, Clive Row, Calcutta.

2525 L.B., Patna City—For liquid glucose enquire of Dalmia Jain & Co., 9, Dalhousie Square East, Calcutta.

2526 S.T.C., Rohtak—A good formula of boot polish appeared in November 1949 issue of Industry. Elaborate process will be found in Prospective Industries, published from this office, price Rs. 3-7 including postage.

2528 B.J.M., Nagpur—Process of making coffee tablets appeared in November 1949 issue of Industry.

2529 M.G.J., Jodhpur—Reply to your letter has been sent by post.

2532 D.K.K., Barpeta—Sheet metal working machines may be had of Alfred Herbert (India), Ltd., 13-3, Strand Road and Francis Klein & Co., Ltd., 1, Royal Exchange Place; both of Calcutta.

2535 J.S., Nabadwip—You may consult Plastic Industry published from this office, price Re. 1. Machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road; Francis Klein & Co., Ltd., 1, Royal Exchange Place; Alfred Herbert (India), Ltd., 13-3, Strand Road, and Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension; all

of Calcutta. Plastic powder may be had of Imperial Chemical Industries (India), Ltd., 18, Strand Road, Calcutta.

2536 O.P., Delhi—Following is a recipe of asthma drops:—Tincture of stramonium 1 part; Laudenum 1 part; Anise-ammonia drops 1 part. Dose 10 to 15 drops in hot sugar water, thrice daily. You may also consult a physician.

2537 M.C.L., Koppal—For preparing gram flour remove the outer coating of the gram by means of a decorticating machine. Now you have to use grinding machine for powdering. Last of all sieve through fine sieve. For machines enquire of T. E. Thomson & Co., Ltd., 9, Esplanade East: Balmer Lawrie & Co., Ltd., 103, Netaji Subhas Road and Marshall Sons & Co. (India), Ltd., 99, Netaji Subhas Road; all of Calcutta.

2541 S.C.M., Jaipur—Process of decolourising spindle and other mineral oils will appear in due course.

2542 K.G.S., Chaibasa—Starch may be manufactured from sweet potato. But so far as we know starch is not manufactured from sweet potato in India. So it is very difficult to suggest names of consumers of sweet potatoes in very large quantity.

2545 L.S.B., Ambala—Rope making machine is not available at present.

2551 J.K.G., New Delhi—Following is a formula of meal powder:—Saltpetre, double refined 15 parts; Charcoal 3 parts; Sulphur flour 2 parts. Constituents of meal powder and gun powder are same. Process of manufacturing fire works will be found in Home Industries published from this office, price Rs. 3-7 including postage.

2552 S. Lucknow—Formulas of all kinds of marking ink will appear in due course.

2555 P.C.C., Bezwada—You may consult the following books published from this office. Manufacture of Toilet Goods, price Rs. 4; Manufacture of Soap, price Rs. 4 and Indian Perfumes, Essences and Hair Oils, price Rs. 3.

2557 T.D., Tundla—For trade mark registration you may negotiate with A. Mitra & Co., 5-2F, Raja Rajballav Street, Calcutta; Law Morris & Co., 19, Strand Road, Calcutta, and Dutta & Co., 82, Harrison Road, Calcutta. We do not know formula of patent medicine like Siroline Roche.

2560 M.K., Tiruchirapalli—Adler car is not imported at present. Mica sheet may be had of Calcutta Mica Corporation, 161, Muktaram Babu Street and Chatturam Haritram Ltd., 161-1, Harrison Road; both of Calcutta. For enamel powder and porcelain powder write to Akhoy Kumar Laha, 1, Dharamtala Street and Chandi Charan Nayak, 124-1, Bow Bazar Street; both of Calcutta.

2561 M.P.P., Rutlam—You perhaps require paper bobbin making machine which may be had of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

2563 L.C.M., Bombay—Process of manufacturing ink will be found in April 1950 issue of Industry.

2564 T.S.G., Kalyan—Formulas of Sen Sen will appear in due course.

2565 B.D.A., Calcutta—Your enquiry has been published in Trade Enquiry Columns.

2566 K.C.T., Phagwara—In order to remove the defect of sugar tablet apply liquid paraffin to the dies.

2570 S.N., Delhi—For rubber working machines enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension; Marshall Sons & Co., Ltd., 99, Netaji Subhas Road, and Francis Klein & Co., Ltd., 1, Royal Exchange Place; all of Calcutta.

2571 A.C., Nigeria—Following is a formula of gun powder:—Nitre 75 parts; Sulphur 10 parts; Charcoal 15 parts. Powder the ingredients finely and weigh separately. Mix thoroughly and bottle. Recipes of Bengal Sweets will be found in Bengal Sweets published from this office, price Rs. 3. Process of manufacturing looking glass will be found in Independent Careers for the Young published from this office, price Rs. 3.

2572 S.M., Madanapalle—Following is the process of making scented sticks:—Scented sticks consist of a compressed mixture of starch, magnesium carbonate and powdered orris orrot with combinations of scents and essences, etc. You may use the following compound.—Heliotropin 20 parts; Vanillin 5 parts; Tincture of musk 10 parts; Tincture of benzoin 20 parts.

2573 S.P.D.W., Tiruppur—Chemicals may be had of Calcutta Chemical Co., Ltd., 10, Bonfield Lane; Banshidhar Dutt, 126, Khengrapatty Street, and Champalal Agarwala, 45, Armenian Street; all of Calcutta.

2574 P.M.W., Sattur—Red phosphorus may be had of Allied Agency, 16, Bonfield Lane, Calcutta.

2575 T.S.G., Madras—Cardboard may be had of Mullick & Co., 82, Harrison Road, Calcutta and India Paper & Board Mills Co., Ltd., 71, Satgachi Road, Dum Dum.

2576 A.H.A.G., Jodhpur—Present whereabout of Fana Block Sazee is not known.

2577 U.C.C., Kanpur—It is very difficult on our part to suggest the best formula of fountain pen ink. Government have granted protection of 37½ p.c. on Indian fountain pen ink.

2578 G.L.C., Aligarh—No such newspaper directory is available. You may however consult Industry Year Book and Directory published from this office, price Rs. 15.

2579 R.C.T., Agra—Formulas of heel ball, sole polish, etc. will appear in due course.

2580 S.B.S., Jhansi—Plastic machines may be had of Francis Klein & Co., Ltd., 1, Royal Exchange Place; Small Machineries Manufacturing Co., 22, R. G. Kar Road; Alfred Herbert (India), Ltd., 13-3, Strand Road, and Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension; all of Calcutta.

2586 B.S.C., Puri—Following is a recipe of tonic tablets:—Calcium hypophosphites 50 grains; Manganese hypophosphites 25 grains; Potassium hypophosphites 25 grains; Iron hypophosphites 25 grains; Quinine hypophosphites 12½ grains; Strychnine ⅝ grains; Potato starch in powder 200 grains; Sucrose in powder to make 350 grains. Mix the hypophosphites of calcium, manganese and potassium with strychnine and grind well in a mortar. Dissolve the iron hypophosphite in a little water, granulate the mixed powders with the solution, and dry the granules. Powder the dried granules and pass together with the starch through a sieve and make up to the required weight with sucrose. Make into 800 sugar-coated tablets.

2587 P.G.M., Cachar—Agent for Eversharp pen is Eversharp Agency, Bombay Mutual Bldg., Hornby Road, Bombay.

2588 R.S.C., Bikaner—Process of manufacturing plaster of paris appeared in March 1950 issue of Industry.

2589 P.M.S., Agra—You may negotiate with Sir J. J. School of Art, Bombay.

2591 H.S.F., Dharmsala—For battery container enquire of Chloride Electrical Storage Co. (India), Ltd., 4, Lyons Range and Electrical Storage Co., Ltd., 112, Narkeldanga Main Road; both of Calcutta.

2593 V.S.S.M., Tinnevelly—Sago making machines may be had of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

2595 R.D., Hissar—Machines required for a bone mill may be had of Marshall Sons & Co., Ltd., 99, Netaji Subhas Road, Calcutta.

2597 C.P., Mathura—We have no book on homoeopathic globule manufacture. Process of manufacturing globules will appear in the due course. For machine enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

2600 G.F., Andheri—Process of mantle making will appear in due course.

2601 S.C.M., Rangali—Process of mirror making appeared in April, 1950 issue of Industry.

2607 D.A.W., Poona—Process of making buttons will appear in due course.

2608 B.S.K., Hariana—Process of manufacturing chalk sticks will be found in Prospective Industries published from this office, price Rs. 3-7 including postage. Chalk stick making moulds may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. Raw materials may be had of Calcutta Mineral Supply Co., Ltd., 31, Jackson Lane, Calcutta.

2610 J.N.K., Rahan—Indian herbs and drugs may be had of Banga Lakshmi Bhandar 13, Cotton Street; Banshidhar Dutt, 126, Khengrapatty Street; Bengal Herbs Stores, 2, Mullick Street; Indian Herb Stores, 31, Mullick Street, and Madhusudan Chatterjee, 19, Mullick Street; all of Calcutta.

2611 S. R. S. I. L., Seethanagaram — For special gum enquire of King Perfumery Works 13, Khetra Das Lane, Calcutta.

2614 K.G.R., Palakol—For paint making machines enquire of Marshall Sons & Co. Ltd 99, Netaji Subhas Road; Francis Klein & Co. Ltd., 1, Royal Exchange Place, and Jessop & Co 93, Netaji Subhas Road; all of Calcutta.

2615 P.C.S., New Delhi—Process of making tea tablets appeared in November 1949, issue of Industry.

2616 M.S.S., Farrukhabad — Power loom may be had of W. H. Brady & Co., Mercantile Bldg., Lall Bazar, Calcutta. Weaving business seems to be profitable. You may also start hosiery manufacture.

2617 K.K.G., Bulandshahr—You may consult Indian Home, 47, Lakshmi Bldg., Sir P. M. Road, Fort, Bombay; Mahila, 123/1, Upper Circular Road, Calcutta, and Caravan, Connaught Circus, New Delhi.

2618 A.C., Jamnagar—Following is a list of chemical manufacturers:—Alembic Chemical Works Co. Ltd., Laxmi Insurance Bldg., Sir P. Mehta Road, Fort, Bombay; Dharamsi Morarji Chemical Co. Ltd., 317-21, Hornby Road, Fort, Bombay; Easter Chemical Co. Ltd., 15, Dougha Road, Ballard Estate, Bombay; Bengal Chemical & Pharmaceutical Works Ltd., 164, Manicktola Main Road, Calcutta; Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta, and Butto Krisao Paul & Co. Ltd., 1 & 3, Bonfield Lane Calcutta. Other addresses you require will be found in Industry Year Book and Directory.

2619 D.G.C., Ahmedabad—For handkerchiefs enquire of the following firms:—Dean Sons, Kulsum Terrace, Colaba, Bombay; Evans Fraser & Co., Hornby Road, Bombay and A Sattar & Bros., 56, Park Street, Calcutta.

2620 S.R.M., Salem—Process of manufacturing sago will appear in due course.

2625 D.I.V., Betad—It is not possible to anufacture paraffine on a small scale. You an manufacture candle from paraffine. Process of manufacturing candle appeared in April 950 issue of Industry. You may apply nitrocellulose lacquer to the earthnware.

2626 N.C.D., Calcutta—For the book equired enquire of Thacker Spink & Co., (1933) Ltd., 3, Esplanade East, Calcutta.

2627 Y.C., Kanpur—We are not aware of ny publisher who pays for stories and writing n health and hygiene, etc. You better advertise n newspapers. Prospect of a physician either omeopath or allopath depends on his mode of reatment and success in treating the patient. For trade mark registration write to Dutt & Co., 2, Harrison Road, Calcutta.

2628 G.N.R., Cuddapah Town—Tin cans ay be had of Bengal Tin Box Manufacturing Co. Ltd., 1. Jadu Nath Mitter Lane, and National heet and Metal Works Ltd., 36A, Sahitya Parishad Street, both of Calcutta. Cardboard boxes ay be had of Bengal Cardboard Industries & rinters Ltd., 165, Cornwallis Street, and S. ntool & Co., Ltd., 91, Upper Circular Road; oth of Calcutta. Refined oil may be had of Vaika Oil Mill, 28A, Pollock Street, Calcutta. alcum powder, Calcium carbonate etc. may be ad of Calcutta Mineral Supply Co. Ltd., 31, ackson Lane, Calcutta.

2629 B.N.S., Arrah—You may start ink anufacture with Rs. 200/- as initial capital.

2630 S.N.R., Banaras City—Pin making achines may be suplied by Baird Machinery Co., Bridgeport, Connecticut, U.S.A.

2636 R.G.C., Agra—For gunny cloth enuire of Dass Brothers, 29, Strand Road and ansal Brothers Ltd., 14-4, Netaji Subhas Road; oth of Calcutta. Process of manufacturing shoe olish, sole polish, heel ball, etc. will appear in he course.

2637 B.W.N., Poona—Following is a formula of incense sticks: Benzoin 100 parts; Tolu alsam 50 parts; Charcoal 700 parts; Saltpetre 0 parts; Sandal oil 50 parts; Patchouli oil 150 arts; Cascarilla oil 3 parts; Grain musk 5 parts. Mucilage of acacia, a sufficient quantity to make hick syrupy consistency. To make sticks dip nto this dry splinters of bamboo and expose hem vertically in the sun to dry.

2638 P.J.K., Kottayur—Knitting machines ay be had of W. H. Brady & Co., Mercantile Bldg., Lall Bazar, Calcutta; Knitting Machines yndicate, 25-26, Waterloo Street, Calcutta, and ehal Chand & Co., P. B. No. 16, Ludhiana. For articulars write to the above firms.

2639 V.D.S., Banaras—We have no book on andle manufacture. An article on candle anufacture appeared in April 1950, issue of Industry. You may take up manufacture of ink, phenyle, etc.

2640 D.C.I., Calcutta—Following is a formula of liquid gum:—Gum arabic 20 lbs.; Water 5 gals.; Glycerine 7 lbs.; Perfume 4 oz.; Formalin 2 oz. Simmer the gum in the water until dissolved, add the glycerine towards the end stirring in well. Then cool, and stir formalin.

2641 V.R.I., Nagercoil—We have no book on jute cultivation. You may however enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta.

2642 P.S.C., Shergarh—Following is a list of old stamp dealers: Bombay Philatelic Co., Sambaya Chamber, Sir P. Mehta Road, Fort, Bombay; Broad Stamp Co., 7, Hospital Road, Calcutta and Ghosal & Co., 85, Tantipara Lane, Santragachi, Howrah. Your other enquiry appears in Trade Enquiry Columns.

2643 S.S., Dehra Dun—Isinglass or fish glue is principally manufactured from the bladders of the sturgeon and other fishes belonging to the same family. The bladders after being placed in hot water, are cut open, washed and exposed to the air with the inner silvery skin upward. This is then removed by rubbing, placed on moistened cloths, pressed and then taken from the cloth and laid either in serpentine winding between three small blocks or placed together in sheets like a book and dried.

2651 H.H., Agra—Tannic acid, gallic acid and acetic acid may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta and Allied Agency, 16, Bonfield Lane, Calcutta.

2652 P.T.M., Mysore—Addresses of agricultural produce dealers you require will be found in Industry Year Book & Directory published from this office, price Rs. 16/4/- including postage.

2653 T.K.M., Tiruchirapalli—To manufacture plaster of paris, grind gypsum to powder in a disintegrator. Then pass through 100-120 mesh screen. Next calcine the powder in an iron vessel with continuous stirring at a temperature of about 120°C. Finally pack the plaster of paris in air-tight barrels either of tin or wood.

2663 K.V.N., Vellore — To improve fire kindling you may add I part saltpetre to the composition.

2664 D.D.S., New Delhi—Following is a recipe of playing card varnish:—Gum elemi 56 lbs.; Methylated spirit 4 gals. Dissolve.

2665 K.K.G., Bulandshahr — For mantle knitting machine enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, and Dawn & Co., 11, Portuguese Church Street; both of Calcutta.

—REVIEW OF BOOKS

MODERN IDEAL HOMES FOR INDIA by R. S. Deshpande, B.E., B.S.E., A.M.I.E. (Ind.), Published by United Book Corporation, Poona 2. Pages 338, price Rs. 12-8.

With increasing pressure of population in urban areas the problem of housing assumes formidable magnitude. Economic house designing and planning therefore becomes an urgent necessity of the times. It must also be taken into account that our old ideas of construction of residential houses are giving place to new ones. The requirements of the people are also taking new shapes in the wake of the rising standard of living and the available amenities of life. New ideas are evolving about proportion, balance and harmony of the building constructions and about allotment of space for various home activities and the appropriate placement of appurtenances. The popularity of concrete construction has also revolutionised modern architecture. The author of the book published a book viz., 'Residential Houses in India' long years ago and we had occasion to review the book in our journal at that time. The book under review though based on that book is an altogether new volume and contains a comprehensive survey of the conditions that make a residential house most comfortable and healthy from all points of view. It explains in full the broad principles to be kept in view when selection of site, orientation and the ideal planning of the house with upto-date arrangements for air conditioning, sound and heat proofing, artificial lighting, etc., etc. are to be made. The book embodies the valuable experience gained by the author on house designing and planning by an extensive tour over the advanced countries. Though many new ideas have thus crept into the book, these have been modified and mellowed down to suit the climatic conditions of the country and social conditions of the people. The special feature of the book is a very large number of illustrated plans, showing layout and elevation with an approximate cost of construction of all kinds, of residential houses, both big and small. The plans embody all the features of the American, English, German, Danish, Swiss, French, etc., domestic designs and even some Japanese features which could possibly be adopted in a tropical country like India and ensure health, comfort, privacy, utility, architecture, economy as well. The book will be of much interest to all those who are thinking of making houses for themselves or who want to make terrace houses, flats, storeyed cottages, etc., etc. The book is thus a most welcome addition to the scanty literature on modern architecture as applied to house construction.

INVESTORS' ENCYCLOPAEDIA 1949-50. Compiled by Kothari & Sons, Oriental Buildings Armenian Street, Madras 1. Pages 1184, price Rs. 15/- (inland) and Rs. 25/- (foreign).

The volume contains valuable information for the investing public who are sadly in want of particulars of working of the jointstock companies whose scripts they intend to purchase, sell, or to hold. The volume under review which is in the fourteenth year of its publication includes the abstracts of the important joint stock companies operating in the different parts of India but also provides an up-to-date economic and financial review with special bearing on its effects on the different Stock Exchanges. Various statistics showing industrial disputes, employment in factory, industrial production, targets of production have been given. Special attention has been paid to the position of Government Securities and Provincial Loans. Conditions in the Share Market in 1949 have been discussed month by month. Major part of the volume is however devoted to the details of working of Banks, Insurance Companies, Coal Companies, Jute Mills, Planting Companies Northern India Tea Companies, Electric Companies, Engineering Companies, Sugar Companies, Railways, Shipping Lines, Airways Services, Cement Companies, Paper Mills, Vegetable Oils, Mining Companies, Chemical Manufacturers, etc., etc. For the convenience of the readers various useful schedules like Income Tax Stamp Duty, have been included in the volume. Relevant extracts of the Bye-Laws of the various Stock Exchanges in India have been appended in the volume. The book will be helpful for ready reference to the investors in general.

A CLASS BOOK OF PHYSICAL CHEMISTRY by T. Martin Loury, C.B.E., M.A., D.Sc, F.R.S. & Samuel Sugden, D.Sc., A. R. C. Sc (London), F.R.S. Published by MacMillan & Co. Ltd., St. Martin's Street, London, Pages 454 price Sh. 3/6 net.

The book coming from the pens of two eminent chemists contains the latest developments on the not too difficult subject of physical chemistry. All the aspects of physical chemistry including chemical equilibrium, molecular weights in solutions, phase rule, laws of mass-

action, catalysis, thermo-chemistry, colloidal electrolytes, activity co-efficient, etc., have been discussed in the book. An attempt has been made to define the scope of complete ionisation in relation to the older theory of reversible ionisation. The book is written in a lucid style in the light of current knowledge and the students of physical chemistry will no doubt be benefited by its persual.

COMPANY SECRETARIAL PRACTICE by M. Satyanarayana, M.A. (Com.), B.L. Prof. of Business Organisation and Secretarial Practice, H. L. College of Commerce, Ahmedabad. Published by Vora & Co. Publishers Ltd., Bombay 2. Pages 496, price Rs. 10/8/-.

While on the one hand the number of companies operating in India are expanding year after year, the management and administration of the companies have now become greatly complicated. Hence it becomes all the more necessary for the secretaries, promoters, directors and managing agents to be fully conversant with the practical and legal aspects of the Indian Companies Act. The book under review presents the whole subject matter with explanations in such a comprehensive way that the readers can easily follow the complicities of the law without reference to or assistance from outside sources. Special attention has been paid to the description of practical administrative procedure. The insertion of tables and forms in positions where reference has been made to them will be specially welcome to the readers. The book covers a wide variety of subjects in 38 chapters, e.g. Law and Procedure relating to the Prospectuses, Allotments, Transfers, etc., Reorganisation of Capital Amalgamations and Winding up Procedures; Forms of Statutory Book, Notices, Reports, Circulars; Power, Duties and Liabilities of Promoters, Directors, Auditors, Members, Creditors; Conduct of Meeting; Latest memorandum issued by the Government of India. Rules made by High Courts in India on points of issue have also been included in the book. The book will be useful for the B.Com. and M.Com. students of Commercial Law as also for the examinees for Chartered Accountants' and Solicitors' Examinations.

REPORT ON THE WORK OF THE INDIA GOVERNMENT TRADE COMMISSIONER, FOR CANADA AND NEWFOUNDLAND. By M. R. Ahuja. Published by Director-General of Commercial Intelligence & Statistics, 1, Council House Street, Calcutta.

The Report affords to readers, both in India and in Canada, not only upto-date statistical data, but also such information as may help in the expansion of Indo-Canadian trade. In addition to the general world and Canadian survey a fairly comprehensive summary of economic conditions in India has been included in the Report for the benefit of the Canadian readers. Apart from the usual summary of economic and trade developments, detailed information and concrete suggestions for the development of trade with Canada have been incorporated for the guidance of Indian manufacturers and exporters. A special chapter has been devoted to Canadian imports from India with comparative and competitive data, as well as suggestions for improvement. The list of products for which enquiries were received during the year have been included. It appears that the major items of exports from Canada to India are wheat, wheat flour, milk, wood and wood products, paper, paper products, newsprint, railway rails, locomotives and parts, automobiles and automobile parts, copper ingots, bars and billets. The three products of major importance as Canadian imports from India are jute and jute products, black tea and carpets and rugs. Other Indian commodities imported into Canada, are vegetable oils, nuts, lac, wool, spices, furs, raw cotton, coir and coir products, mineral ores, etc. The Report offers much valuable information bearing on Indo-Canadian trade and will be of inestimable value to those who want to extend trade with Canada.

NOTICES & REVIEWS

(Manufacturers sending specimens and samples of their products for notice and review may please note that no notice is published of medical preparations and allied substanlles in this section.)

RUBBER SOOTHER

We are glad to receive a sample of rubber soother for infants manufactured by The Prakash Industries, India, Post Box No. 1004, Delhi. The quality and make-up of the soother is excellent.

TRADE ENQUIRIES

(To communicate with any party write to him direct with name and address given below mentioning Industry.)

2708 S.N.V. Nataraja Pillai, 5-1, Portuguese Church Street, Calcutta 1—Wants to be put in touch with the suppliers of derris root and derris powder.

2840 K. Velasawmy Chetty, 11-91, Thyagaraya New Street, Coimbatore—Wants to be put in touch with cloth merchants of Sholapur and Hubli.

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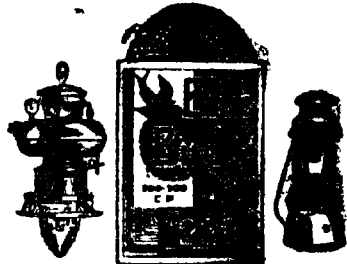
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EDITORIAL CONTENTS FOR FEBRUARY, 1951

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K. N. BANERJEE.

VOL. XLI. CALCUTTA, FEBRUARY, 1951. No. 491.

ENGINEERS IN CONCLAVE

JANUARY 1951 will be long remembered as a landmark in the annals of the engineering progress in India. She was the venue of no less than four international engineering conferences viz; International Association for Hydraulic Research, Fourth Congress on large Dams, Sectional Meeting of the World Power Conference and First Plenary Session of the International Commission on Irrigation and Canals.

340 eminent engineers from 38 foreign countries including the U. S. A. and Russia attended the sessions in addition to 400 engineers from different parts of India. This is indeed the first time that such a big number of engineers are in conclave in any part of the world to promote the happiness of man and add to the amenities of the under-developed nations of the world.

A large number of papers were read by the foreign and Indian representatives. The sectional meeting of the World Power Conference discussed a good number of papers on subjects by experts from the participating countries in their respective sphere. An interesting paper discussed on load planning which dealt with power planning and utilization for India from the overall perspective. The large multi-purpose river valley schemes, under execution now, had to be completed early so that the primary need—food—might be produced sufficiently. The by-product of these schemes mainly power, had to be utilized quickly in large industrial units like steel, aluminium, fertilizers, textiles, etc. and in extensive schemes of lift irrigation and rural supplies for cottage industries. Some of these industrial units like aluminium and fertilizers would have to be subsidized in the national interest. Various aspects of designing and construction of dams, arrangement of spillways, irrigational systems also came up for discussion.

The Conference has special significance in as much as India has under active consideration a number of hydraulic, engineering and irrigational projects for accelerating the growth of industries by the supply of cheap power and for removing the acute food scarcity from which India is keenly suffering.

RESEARCH IN INDIAN DRUGS

India is a veritable emporium for all kinds of medicinal herbs and drugs and the export of crude drugs forms an important item in our export trade. The distribution of many plants described in existing literature is incomplete, vague and out of date. Availability of more accurate information would besides assisting the supply of reliable material for the export market, place in the hands of Indian industry valuable raw materials for conversion into efficacious medicines according to both indigenous or the western system of medicines.

Recognising the importance of the subject, the Council of Scientific and Industrial Research some years ago sponsored a scheme of research on "Survey, cultivation and improvements of Medicinal Plants". For working out their distribution, Indian medicinal plants have been divided into the following three separate categories:—(i) Plants recognized in the British Pharmacopia and their substitutes growing in India, (ii) Plants recognized in the British Pharmaceutical Codex and their substitutes growing in India; and, (iii) Important plants used in the indigenous system of medicine.

The first part of the work, it is understood, has already been completed and a brochure containing authoritative information about a large number of plants is under publication. This will be of interest to all those connected with drug industry including collectors, cultivators, dealers and users of drugs in India and also research workers and botanists. Investigations regarding the other categories, which are being continued, have brought to light, the manner in which spurious substitutes of even important drugs like saffron, aconite, mastic which find an important place in the indigenous system of medicine are prepared.

In addition to this survey, arrangements have been made to secure supply of reliable seeds of different drugs from all over the world with a view to scientifically study their cultivation in India. An additional object in view has been to improve the yield active principles of the plants with various types of manures and other means. As a result of experience, cultivation of belladona, hyosyamus, digitalis, pyrenthrum, etc. is now being carried out on a large scale and experimental cultivation of medicinal plants like podophyllium, artimesia, aconite, mentha, lavender, etc. has been started.

PHARMACEUTICAL DRUGS IN INDIA

While on the subject it may be mentioned here that the subject figured prominently in the recent sessions of the Indian Pharmaceutical Congress. Dr. D. L. Shrivastava, presiding over the Pharmaceutical Chemistry section of the Congress, referred to the fact that some quantities of biological products like sera and vaccine, here are prepared but most of the patent remedies and specific drugs like sulphonamides, synthetic antimalarials and anti-biotics have still to be imported. The drug imports in India reached the staggering figure of about Rs. 8 crores in the year 1949. The fundamental reason behind India's utter dependability for essential drugs rests on the lack of co-ordinated effort. For, so long as India does not produce the basic stuffs economically and in large enough quantities, India will have to depend for her essential requirements on foreign countries. Nearly 75 per cent of the various official vegetable drugs grow in a state of nature in this country. Equi-

valent substitutes of others must be investigated, and considering the varied types of climatic and adephic conditions that are available in this country, adaptive cultivation of important exotic medicinal plants can be undertaken profitably.

Apart from the vegetable drugs, research work must be carried out for devising processes for the ultimate production of chemotherapeutic agents, antibiotics and other biological products. This again requires a planned co-ordination of work among the various groups of workers in Chemistry, Biochemistry, Microbiology, Pharmacology and finally the technician.

It is argued that the Indian public have no confidence in some of the drugs made in India, and many practising medical men often prescribe medicaments of foreign origin in preference to indigenous ones. This is a complaint which should be looked into carefully by joint committees of representative medical associations, chemical manufacturers' organisations, and pharmaceutical association. The Tariff Board have recently stated that indigenous manufacturers have to contend against a prejudice factor in the Indian market which may be estimated at 20 per cent. of the sale value of the product. It is sure that this prejudice will soon disappear in a country, whose citizens take the greatest pride in their hard-won independence, provided the goods supplied are up to the standard. If the Drug Control Act functions properly and the active co-operation of all the parties concerned is assured, there is no reason why all sub-standard preparations should not be rigidly excluded from the Indian drug market and the complete confidence of the Indian public gained in the immediate future.

NEED FOR PRIVATE ENTERPRISE

Dr. J. C. Ghosh, Director, Eastern Higher Technical Institute, Hijli, recently dwelt at length on the need of private enterprise in India. He said that the productivity per man-hour in India was '094 as against '996 of U. S. A. and .576 of U. K. Assuming an increase in population of 1.2 per cent per annum, it would require an investment of 12.5 per cent of the existing national income in order to maintain the additional population at the present level of employment and also increase the productivity per man-hour of .094 by 1 per cent. Hence if we wish for betterment in the present level of employment, with the object of achieving full employment at some distant future, an investment much higher than 12.5 per cent of the national income will have to be made every year. Taking the present national income of India, to be 6,000 crores of rupees, an investment of 750 crores of rupees per year will be necessary to maintain employment at present level and increased man-hour productivity by 1% per year. Hence an investment rate of 300 crores as proposed by the Planning Commission might not be sufficient for maintaining the present level of employment, not to speak of increase in man-hour productivity.

GOVERNMENT IMPORT POLICY

The Government of India have recently announced the import policy for the half year ending June 1951. As far as possible continuity in the licensing policy adopted during the last six months has been maintained. Machinery essential for the development of the country and industrial raw material enjoy as usual a high degree of priority. Imports of essential consumer goods have also been allowed. Certain details are given below for general information:—

No imports of cotton textiles for consumer use will be permitted in 1951. Only two kinds of cotton cloth will be imported.

namely umbrella cloth and italians—of sateen weave for lining.

Licensing of certain categories of iron and steel goods falling under Nos. 22, 24, 29, 38 and 40 of part 1 which was previously done by the Iron and Steel Controller, Calcutta, has been taken over for licensing by the Deputy Chief Controller of Imports, Calcutta.

Whereas in the past licences have been issued to cover imports from specific countries mentioned by a license in his application it has now been decided that as far as possible licence will be issued to cover areas specified in the public notice rather than the specific countries. As a result of this decision, the licences issued will be of the following four main types:—

General Licences will be valid for the import of goods mentioned therein from any country or countries included in the dollar, hard and or soft currency areas; Licences for Japan will cover imports from Japan only; soft currency licences will be valid for the import of goods mentioned therein from any country or countries in the soft currency area; and specific licences will be valid only for the country mentioned therein, will be issued, for example, when a trade agreement has been concluded with the country in question, and the article concerned is included under the trade agreement but is not licensable from the rest of the licensing area in which the country in question is included.

MECHANICAL TIME-PIECES MACHINERY

Information has been received from the First Secretary, Indian Liaison Mission, Tokyo, that Messrs. Pacific Projects, P. O. Box 444, Tokyo Central, Japan, are in a position to supply complete machinery and plant for the manufacture of mechanical time-pieces. The Tokyo firm are not themselves manufacturers but they desire to negotiate for the sale of complete equipment nd installation of a plant in India with a manufacturing capacity of a considerable number of alarm clocks or decorative time-pieces.

MARKET FOR INDIAN GOODS IN SOUTH-EAST ASIA

The present is most opportune time to take measures for increasing India's trade with S. E. Asian countries. Only a good market for cotton piecegoods and yarn, jute goods, manufactures of iron and steel, cement, paper and stationery, electrical goods and drugs and chemicals produced in India exists there. but also a great amount of goodwill for India and an evident keenness for developing trade with India is also evident there.

In regard to cotton textiles, the increased demand is reflected in the considerably larger volume of exports that have already taken place. The limiting factor here, however, has been the quantity available for export. In Indonesia, Indian cotton textiles have mostly been going via Singapore. The proposed trade agreement with Indonesia provides for some direct exports to that country. So far as Singapore, Malaya, Thailand and Burma, are concerned there appears to be a keen demand for Indian textiles. Burma has already extended its O. G. L. for import of cotton piecegoods till the end of December, 1950. It must however be pointed out here that the maintenance of a proper quality of the exported cotton piecegoods is essential. In fact, it would be unwise both for manufacturers and exporters to remain oblivious of the fast-increading competition from other exporting countries. Indian manufacturers should make special endeavours to comply with the requirements of individual markets, particularly in respect of design, quality and packing. It would be

dangerous to work on the assumption that they can sell whatever they produce.

Indian handloom cloth, specially loongis, have their traditional markets in the South East Asian countries, particularly Malaya and Burma. As most of these countries are developing their own handloom industry, Indian handloom cloth, must adjust itself to the fast changing requirements both in respect of quality and design, if the existing markets are to be retained.

Hardware including machineries and tools, electrical goods, cement, coal, chemical and pharmaceutical products, paper and stationery are some of the other items which, have got good demand in the South East Asian countries. Indian ceiling fans, hardwares, switches, etc., appear to have good possibilities in all these countries. Similarly, cement has a good market; but, as most of the countries have damp climate, it is essential that packing is done in paper bags to present the cement from getting moist. Gas coal has good demand in Indonesia while bunkering coal has market in Malaya. Chemical and pharmaceutical products, can have a good market in the South East Asian countries provided the manufacturers organize their sales through direct contacts and adhere to international standards in regards to quality, etc., Indian manufacturers of various hardware items should visit the South East Asian countries for organizing the sale of their products.

The South East Asian countries are also in a position to supply to India various commodities, particularly raw materials. Rice, for example, can be supplied by Burma and Thailand. Other commodities which can be obtained are palm oil, copra, coconut oil, spices, tin, timber, etc. In the proposed trade agreement with Indonesia provision has been made for importing palm oil, copra, coconut oil, spices, etc. Spices, copra, coconut oil, tin and timber can also be had from Malaya. Malayan tin-ore is smelted in Penang while Indonesian tin-ore is sent to Holland for smelting and for export from there as Indontsian tin. Tin ore is also available from Thailand.

AYURVEDIC PHARMACOPEA

The need of an All-India Ayurvedic pharmacopea was referred to in the Ayurvedic Section of the Indian Pharmaceutical Congress. A number of suggestions were made for the spread and all-round improvement of Ayurveda. These include: (1) compilation of books giving full description of plants, creepers and herbs and of minerals and organic matters with their full medicinal value according to Ayurvedic system; (2) establishment in every State of a museum and harbbrium with a library for reference in research work; (3) formation of a Central Committee consisting of representatives of all the pharmaceutical workers of India and with their aid establishment of a Central State Research Institute. It would be an important function of the Central Committee to see that Ayurvedic medicines were popularised in and outside India and that the prices of medicines were appreciably low in this poor country. It was also urged that there should be one standard Ayurvedic pharmacopea for the whole of India so that the Ayurvedic drugs might have the same composition and standard. The suggestions are well thought out. It is to be hoped that the lovers of Ayurveda will make an honest effort to give them a shape.

INTERNATIONAL ENGINEERING EXHIBITION

The Indian International Engineering Exhibition, 1951 was inaugurated in New

Delhi on 18th January by Mr. N. V. Gadgil, Minister for Works Production and Supply. It is fortunate that it has been organised to coincide with the three international ingineering Conference going to be held there and is the biggest exhibition of its kind ever held in India.

Twenty-one countries. 38 research and other organizations of India and 34 industrial and commercial concerns are participating in the exhibition. The large number of foreign and Indian participants was proof of the increasing common desire on the part of all nations to get together and apply the joint pool of world knowledge for the benefit of humanity at large. There are exhibits of sources of fuels and oils, different type of power generator and power plant and various phases of utilization of power and the machinery of this utilization. With the help of these exhibits the common man will be able to visualize for himself the shape of things to come and to follow with understanding the purpose and technique of the development scheme.

The exhibition is a remarkable effort at "public education" in technical subjects concerning engineering and industry. State Governments, the Central PWD and Embassies have used charts, pictures, relief maps and models to explain in a popular way the nature and extent of their engineering projects. The entrance to the exhibition has been designed as a working model of a dam with tunnels on either sides and water over the spillway of the dam shooting off in a ski-jump. Another feature which will attract the visitor is a relief map of India on "an inch to a mile" scale. The map depicts storage dams, reservoirs, rivers and existing and proposed canal systems. The work of the Central Waterpower, Irrigation and Navigation Commission's research station at Poona and models of the Hirakud, Damodar Valley and Bhakra dams occupy other sections of the exhibition. Among foreign exhibits are models of the British Electric Company and other engineering projects.

STANDARD FOR TESTING FERROUS METALS

India consumes nearly 1.5 million tons of iron and steel on an average every year. A considerable portion of this quantity goes in the fabrication of structures on which the safety of lakhs of human beings depends. Before steel can be put to such use, it is imperative to evaluate its physical properties to a high degree of accuracy. In order to standardise test methods used in the estimation of the tensile properties, the Indian Standards Institution (Civil lines, Delhi), has brought out an Indian standard specification for tensile testing of metals (ferrous).

The specification describes in detail standard test pieces for tensile testing and includes recommended methods of procedures in testing ferrous metal plates, sheets, strips, sections, rounds, square and hexagonal bars, rivets, etc. With a view to obviating any possible ambiguity over the significance of technical terms which are used to indicate important physical properties of metals, such as extension, elongation, limit of proportionality, elastic limit, etc., standard definitions have been laid down. Forms of tensile test pieces, which have a considerable influence on the observed values of tensile strength, have been standardised. Special test pieces for cast iron and malleable cast iron have also been included. An appendix to the standard discusses the accuracy of the tensile test results.

—Mechanical Leathers & Their Specific Tests.

MECHANICAL leathers comprise a large variety of products. Various ypes of leather belts and round leather ands are employed for power transmision in many industries because no other iaterials have quite the same high tensile trength, flexibility and frictional characteristics. The natural elasticity enables eather belts to run at much less tension han other types and so provides for recoery after transmitting the required load. eather belting at its rated horse power as a big overload capacity. This is a valuble safety valve, which protects the iachine and belt from overstrain.

The cotton and wool industries use iany types of leather for roller coverings, ickers, picking bands, buffers, check traps, carding, combing, gilling, condener tapes and rubbers. Hydraulic power s being used to an ever-increasing extent nd its efficiency is dependent upon the ccurate development and application of eather packings.

There are also leather laces of high ensile strength, gas-meter leather and eather protective clothing gloves and iprons. More recently special leathers iave been produced to resist elevated emperatures for use as oil and air seals n aero and automobile engines.

SPECIFIC TESTS

The testing of quality and suitability of leathers for these various applications oresents many problems. Chemical analysis gives much useful information. Physical tests serve as a useful guide but in some cases it has not been possible to devise tests which simulate actual working conditions sufficiently and actual large scale tests are necessary. In this article it is proposed to discuss some important tests of industrial leathers.

The first step in testing any industrial material is to obtain a representative sample of the bulk and it is then analysed to see whether its quality conforms with the requirements of a specification. With leathers, it is difficult to choose a suitable sampling position because the chemical composition and physical properties vary in different parts of a tanned hide. So it is usual to specify a minimum standard of quality that should be expected by buyers and users who require reliable quality.

LEATHER BELTING

Many countries have specifications but the British Standard Specification are generally recognised in the industrial world. Good belting calls for skill on the parts of the tanner, the currier, the beltmaker and the user. A brief account of these is now described.

THE TANNER

The tanner starts with the hides and in most of the specifications stress is laid on the necessity of using sound types, well flayed and free from serious defects. They need to be well grown, that is plump and level. The B. S. I. Specification requires the use of fresh or wet-salted ox hides. The vegetable tannage must be mellow, for anything approaching harshness is fatal to a belt. So the hides are tanned with vegetable tanning materials by the lay-away process in pits. Mineral acids must not be used for plumping the hides because long fibres are needed to give strength and pliability. Pure Newfoundland cod oil is specified for oiling the butts before drying them out.

THE CURRIER

The currier has to scour the belts on the flesh and grain sides to remove surplus tan so as to leave the fibres clean to

receive the stuffing grease and they are skived on the flesh side to remove loose fibres. The stuffing mixture consists of pure Newfoundland cod oil and good quality beef or mutton tallow or other suitable animal fats or oils. This dubbin is applied by hand to the sammed moist leather. It is also specified that the butts shall be thoroughly well set out during the currying process to minimize stretch and give a smooth finish to the grain side.

After the currying process is complete the butts are laid down for at least eight week to season thoroughly. They are then to be finished on the grain and flesh sides, the thin protective layer of grease left on during the seasoning period being cleaned away. Dope finishing is prohibited but light staining is permitted.

THE BELTING MANUFACTURER

The belting manufacturer then proceeds with his selection and cutting. It is essential to cut the strips lengthways of the butt and not from belly to belly. They must be within such a distance from the backbone so as to include only firm, sound leather. This "centre stock" is more uniform in texture and strength than the rest of the butt and consequently less prone to stretch unevenly.

EXAMINATION OF THE STRIPS

The second step is the careful examination of the strips. Flaws, along with all soft and loose fibred leather on the ends of the strips, are cut away. The strips selected must be free from open warble holes, but one blind warble per 2 in. of width is permitted provided that the number of strips with blind warbles does not exceed 20 per cent. of the total number of strips in the roll of belting.

LENGTH OF THE STRIPS

The length of the strips is also specified. The maximum is 54 in. and the minimum lengths, which do not apply to end pieces of rolls or end pieces of cut lengths of made-up belting, are 30 in. for stripe up to and including 3 in. and 36 in. for strips over 3 in. in width.

WIDTH

The width of the belt is important because the horse-power transmitted is directly proportional to the belt speed and the width. It is therefore necessary that it shall be uniform throughout and not less than that specified.

THICKNESS

The thickness is the average thickness and no point in a single belt is allowed to be more than 0.5 mm. thinner than the specified thickness, which is stated in millimetres.

JOINING OR "SPLICING" THE STRIPS

The third step is joining the strips, which is a very important factor reqiring particular attention. The matching together of the strips in correct relation to their position in the hide is of the utmost importance in producing a belt which is well balanced and true and all the laps must be perfect. In the single belts, they are joined shoulder end to shoulder end and butt end to butt end. Centre strips only are used in double belts of 12 in. and over. The length of the splice varies with the width of the belt, for example, it is 7 in. in single belts of widths from 3½ to 6 in., whilst 4 in. is required in double belts up to and including 5 in. in width.

The direction of the splices is, of course, important. They must be made to run in the same direction in single belts. The points of any two splices in double belts must not be nearer than 12 in. and the direction of the joints of the top ply when looked at in cross section must be laid in the opposite direction to the joints of the bottom ply. The points of the

splices are scarfed, that is trimmed to a fine edge, and squared at right angles to the edge of the belt so that they will fit perfectly.

CEMENTING

Before cementing, the surfaces of the splices are thoroughly roughed. They are then joined together with a flexible cement possessing good adhesive properties and maintained under pressure until it has set thoroughly.

Box and hydraulic presses are used and the pressure applied is generally about, 1,680 lb. per sq. in. Leather belts may be made endless or coupling devices utilizing lace sewing or metal fasteners may be used. Copper wire, lace or hemp sewing is sometimes used as an additional safeguard in single or double belts.

CHEMICAL ANALYSIS

In order to test the quality of the leather used in making belting it is usual to subject it to chemical analysis. The British Standard Specification was designed to ensure that the leather shall be free from adulterants of any description. The sampling positions for rough and curried butts, and, also, for belts are specified and the results are expressed as percentages of the fat-free leather with a moisture content of 15 per cent.

It is specified that the following limits shall not be exceeded: Glucose, 2.25, Mineral Ash, 2.0, Water-soluble Matter, determined at 45°C., 24.0. Acidity is a very important matter because acids rot leather especially at elevated temperatures. It is, therefore, specified that the leather must not contain more than 0.5 per cent. by weight of free mineral acid, calculated as sulphuric acid when determined by the Procter Searle Method. In view of the difficulty of obtaining concordant results by this method of analysis, a maximum allowance for variation of plus 0.2 per cent is permitted. Chemical analysis also yields other important information. For example, free fatty acids in the grease of a belting leather stitched with copper wire are objectionable because they corrode the metal portion if it is a copper alloy causing the appearance of a verdigris-like tarnish.

MICROSCOPICAL EXAMINATION

Microscopical examination is useful though it is not possible to include it in any specifications. The unique properties of leather are due to its fibre structure. Each fibre bundle is composed of about 450 little fibres woven together like a piece of rope and it is about as thick as a human hair. The greatest tensile strength is obtained if the fibres are pulled along their lengths and the least if they are pulled across their length. The microscope shows whether the tanning has been such as to give a medium angle of weave. If the weave is more horizontal, the leather will be stronger but it will stretch too much.

TENSILE STRENGTHS

With belting leathers, the main requirements are maximum strength with minimum stretch. The British Standard Specification for Vegetable Tanned Leather Belting specifies that the minimum tensile strengths of Single and Double Belts must be 3,000, and for Single and Double splices 2,500 lb. per sq. in. Five 6-in. test pieces are cut with a metal die from each batch of 2,000 feet. These are 1¼ in. wide at the ends but the middle 2 in. is only ½ in. wide.

A good brand or Denison machine is suitable for the test but any machine can be used providing that the rate of travel of the straining head is about 9/16 in. per minute. In calculating the tensile strength as lb. per sq. in., the minimum thickness in the middle portion is used

for determining the area of the cross-section.

PERCENTAGE ELONGATION

The percentage elongation at break is generally recorded but this figure is very variable over quite a small area and so it is specified that this must not be more than 6 per cent when a load of 750 lb. per sq. in. cross-section is applied for 15 minutes. The permanent elongation is also measured after the load has been removed and this must not exceed 2 per cent when the belt has been allowed to hang unloaded for 4 hours.

CRACKING

This is obviously a sign of faulty belting leather though it may have been caused by storing in too warm a place. The leather must not crack on the grain side and the splices must not open at the points when the belt is bent through an angle of 180°, grain side out around specified forms. For example, single belts up to and including 5 mm. in thickness are bent round mandrels of 1 in. diameter.

PIPING

Piping is another sign of low quality. The leather must not show wrinkles on the grain when bent through an angle of 180°, grain side inwards, around specified forms. For example, single belts up to and including 6 mm. are bent round mandrels of 2 in. diameter. Mechanical tests are obviously important because they show the performance of the finished leather or belts under conditions which are similar to those in actual use.

LEATHERS FOR THE COTTON AND WOOL INDUSTRY

It is impossible to lay down specifications for these leathers but the following are the main requirements and some tests.

PICKERS

During the weaving the shuttle is propelled by a sudden below of the picker arm and held by a picking band. The pickers thus have to take the force of the blow against the shuttle and retain their shape. They are, therefore, generally made of Limed Buffalo hide, steeped in special oil before use, or vegetable tanned or chrome leather.

PICKING BANDS

These must be able to stand a constant series of quick, sudden shocks over the whole extent of a band and easily wrap round the stick for adjusting. They must be elastic without permanent stretch because a stretchy band is liable to make the shuttle of a loom catch and cause warp damage unless constantly tightened up. Thus a tensile strength and elongation test are useful. They must be resistant to heat and able to retain their grease because heat is generated near the points of contact with the picker arm and picker. Chrome and Mixtan types, are available to suit individual requirements.

BUFFERS

Buffers are placed on the picking spindle to check the picker when the shuttle leaves the loom. The leather must be capable of being folded flat back on itself to form a thick, resilient pad. Vegetable and chrome tanned leathers are used.

CHECK STRAPS

These are used to check the shuttle against the picker when entering the shuttle box. The leather must be firm and withstand friction against the steel parts of the loom, and also, must not become soft due to take-up of machine oil. Tensile strength is obviously important.

CARDING LEATHERS

There must be firm, non-stretchy and yet be supple enough to bed down on the roller of the carding machine. They must be of compact fibre structure in order to hold the wire teeth. If vegetable tanned,

the content of water-solubles should not be too low because these contain protective non-tans which make the leather more resistant to the rotting action of the iron cards.

COMBING AND GILLING LEATHERS

The endless combing band travels with the wool through fluted metal rollers to the combing pins, which are heated. It must constantly bed down to the flutes of the rollers without developing crackiness, and be resilient under the constant pressure. It must be free from tackiness and not develop static electricity, which would make the wool adhere to it. The leather must be heat-resisting and of high tensile strength. Tests are desirable for tensile strength compressional resistance, uniformity of thickness under pressure and liability to channelling and cuts. Gill Box leathers should be firmer than Combing leathers. Chrome or combination tannage leather specially processed is considered ideal for these applications.

CONDENSER TAPES

Condenser tapes must withstand the friction caused by running in the grooves over small diameter rollers and be free from stretch which would give thin places in the yarn. It is also necessary that they should be of even substance and uniform elasticity to prevent them from pulling narrow or thin during use. They are liable to crack or break, which is accentuated by the blending oil used on the wool. The leather is usually of vegetable tannage with 10 to 20 per cent grease to give the required flexibility, or rawhide tannage.

HYDRAULIC LEATHERS

Accurate packings and washers are needed to retain oil, water or air under low, medium and high pressure within the working cylinders. These may function under a wide variety of conditions and so a number of leathers of vegetable, chrome or combination tannages are used. They may be moulded in various forms. Hydraulic cup, hat, ram, face and vee leathers are standard forms but leather packings are available to suit special applications.

In testing such leathers it is necessary to know whether they will mould and stand up to the conditions of use. They must have the rquired flexibility, tensile strength and toughness and withstand the action of various temperatures, steam, oil or acid fumes, or other conditions which may be met with in the particular application.

Chemical analysis gives useful information. For example, the vegetable tanned leathers used for ordinary packings working under normal conditions and temperatures should comply with the chemical tests in the British Standard Specification for Belting Leather. Mineral oil should not be present in the grease. When used as a lubricant, it softens the leather and makes it spongy and so neatsfoot or a vegetable oil is preferable.

Some chrome tanned leather are resistant to high temperatures, steam, oil and acid fumes. The following physical Tests are suggested:—

(1) CRACKING.—The leather is heated to 70°C., and bent through an angle of 180° over a rod 0.5 in. in diameter, grain side out and clamped in the bent position at this temperature for 1 hour.

(2) TENSILE STRENGTH.—The location of the sample is about 15 in. from the root of the tail and near the backbone. Four of the six leathers tested give results below 2,500 lb. per sq. in. and it is concluded that tensile strength is not a characteristic of primary importance for hydraulic packing leather.

(3) STRENGTH.—It is doubtful whether there is any relation between stretch and usefulness for this type of leather.

(4) SHRINKAGE IN HOT WATER.—Until more information is available, the shrinkage in the area of the leather is not to be more than 5 per cent when a specimen is placed in water at room temperature, rapidly raised to 92°C. and kept at this temperature for 5 minutes.

HEAT RESISTANT SEALING LEATHERS

The war has led to great developments in the manufacture of different types of sealing leathers. The transmission gear in aeroplanes and tanks needs oil seals to ensure retention of oil. Air seals are required on certain types of aero engines. Land tanks need seals against sand and amphibious tanks against sea-water.

Parallel with the improvements in aeroplane engines, tanks and other vehicles and increasing varieties of conditions, the properties demanded of these leathers have expanded. Oil seal leathers, which have the advantages of lubricating due to wick action and not scoring the shaft because they do not harden up in hot oil, must be capable of being moulded so that they retain their shape and flexibility at elevated and very low temperatures. Some air seals have to withstand temperatures as high as 250°C. for intermittent periods. Seals are also needed for chemicals, greases, edible fats and gases in various machines and plants. The prolem of testing samples for their suitability for these various applications is a difficult one. The official Method of the American Leather Chemicals' Association determines the resistance of leather to deterioration at 100°C. in the presence of moisture as a percentage loss in tensile strength.

MANUFACTURE OF LEAD CHROMES.

THE chromates of lead comprise the most important range of yellow pigments used by the paint manufacturers. They are produced in a variety of shades, such as primorse, lemon, middle and orange chromes, and as red chrome or American Vermilion. These shades of colour vary from the lightest sulphur yellow to dark reddish orange, each variety and shade being produced independently according to the different methods employed.

Theoretically the manufacture of chrome yellow is simple, but in practice to obtain the best results it is not so. Lead chrome is a sensitive compound, the colour and molecular structure largely depending upon the conditions employed in its manufacture. A little excess of bichromate will alter the shade from lemon to orange. Moreover leaving the pigment too long in contact with the wash water will alter the shade, causing the pigment to become pulpy. The temperature during manufacture and during drying will also have a marked effect. Definite quantities of water must be used because this is one of the most important factors in maintaining a uniform shade When large quantities of water are used, the resulting product will be lighter in colour than when half the quantity is employed. Normal lead chromtte has the formula $Pb Cr 0_4$, and basic lead chrome $Pb 0 Pb Cr 0_4$. Normal lead chrome can be prepared by adding 20 c.c. of normal (N/1) potassium chromate solution to 19 c.c. of normal (N/1) lead acetate solution. If 20 c.c. of N/1 lead acetate is treated with 10 c.c. of potassium chromate, and the mixture evaporated to dryness on a water-bath, and washed with water, the basic compound is produced.

When making chromes, except in the case of the orange grades, these pigments should be struck cold, and the lowest temperature maintained. A large amount of water—in other words dilute solutions—is best. When "striking" the colour, continuous and thorough stirring should be maintained, and after the colour has completely formed, and settled, no time should be lost in completing the washing process.

MATERIALS USED

In the manufacture of lead chromes the usual salts used are neutral acetate of lead, nitrate of lead, litharge and acetate acid, and in some cases white lead and nitric acid. Bichromates of potash and soda are both used.

In making chromes from lead acetate proceed as follows:—On a raised platform are arranged several capacious wooden dissolving vats provided with pipes for delivering hot water, cold water, or steam as required. The bottom of the vat has a large top fitted with a strainer, and is connected with a wooden channel to the striking vat beneath. The striking vats are also made of wood and are fitted with mechanical stirring devices. In order to facilitate the removal of the top liquid after the pigment has settled and to expedite the washing process, holes are provided down the side of the vat at intervals of about one foot, which are closed with wooden plugs.

PRIMROSE CHROME

In the manufacture of primrose chrome the following formula may be taken:—

	parts by weight (lb.)
Lead acetate	188
Lead sulphate	42
Bichromate of potash	39

Potash alum	52
Soda carbonate	188

Dissolve the acetate of lead in 250 gallons of water in one of the dissolving vats and then add the sulphate of lead in the form of a fine cream through a sieve, using about 20 gallons of water for the amount of lead sulphate. Should hot water have been used when dissolving the acetate the liquid must be cooled down to 60°F before striking takes place. This is then run into the striking vat, and a further 250 gallons of water added, making a total of 520 gallons. Now dissolve the bichromate of potash and alum in 160 gallons of the water, and the soda carbonate in a third vat in about 60 gallons of water. Set the stirring plant going and slowly run the bichromate solution into the striking vat, when all is in, at once add the soda solution. The chrome is then allowed to settle—the top water run off by removing the plugs at the side of the vat, and after the water has been run off slightly above the level of the pigment, the plugs are replaced and the vat filled up with clean soft water, and the pigment allowed to settle again. The chrome is usually washed about 4 or 5 times, and then the pigment is passed on to the filter press and subsequently dried at low temperature (150°F).

Other recipes for the production of primrose chromes are given herewith.

I.

	parts by weight.
Lead nitrate	108
Potash Bichromate	22
Potash alum	32
Soda crystals	112

II.

	parts by weight.
Lead nitrate	175
Bichromate of soda	37
Potash Alum	56
Common Salt	28
Glauber's Salt	56

LEMON CHROME

The following are the typical recipes for lemon chromes. The method employed in these preparations is identical with those of the primrose chrome already described.

I.

	parts by weight.
Lead acetate	100
Potash bichromate	25
Sodium sulphate	34

II.

	parts by weight.
Lead nitrate	112
Bichromate of soda	18
Sodium sulphate	18
Soda crystals	18

MIDDLE CHROMES

The preparation of middle chromes is also identical with those previously described under primrose chrome. A couple of recipes follow:—

I.

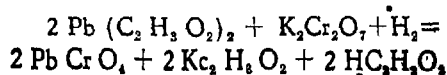
	parts by weight.
Lead nitrate	140
White lead	91
Bichromate of soda	84

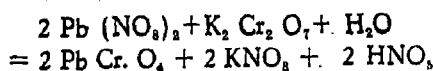
II.

	parts by weight.
Lead acetate	100
Bichromate of potash	30
Sodium sulphate	21

CHEMICAL REACTIONS

In the formulas mentioned above the following reactions take place. The reaction in the case of lead acetate is shown below:—

$$2\,Pb\,(C_2\,H_3\,O_2)_2 + K_2Cr_2O_7 + H_2 = 2\,Pb\,Cr\,O_4 + 2\,Kc_2\,H_8\,O_2 + 2\,HC_2H_2O_2$$

In the case of the nitrate of lead the reaction is

$$2\ Pb\ (NO_3)_2 + K_2\ Cr_2\ O_7 + H_2O = 2\ Pb\ Cr.\ O_4 + 2\ KNO_3 + 2\ HNO_3$$

In the formation of chrome yellow the velocity of the reaction increases with increasing temperature. Freshly precipitated lead chromate gradually changes in colour from a bright yellow to orange, so in practice a certain proportion of lead sulphate is precipitated with the chromate in order to prevent this change from taking place. When lead chromate is precipitated in the presence of excess of normal lead acetate, the yellow precipitate does not change in colour, when left in contact with the solution nor even when boiled with the latter, but if separated, and washed with water or with acetic acid it gradually acquires an orange test. If the precipitation is effected in the presence of excess of basic lead acetate, the colour of the precipitate changes gradually from golden yellow to red. This change is probably due to the separation of water from the basic lead chromate first precipitated with the formation of a compound.

In the manufacture of lemon chromes C. O. Weber states that though various chromes possess the same chemical constitution they may give very different shades and also vary in their physical properties as regards hardness and covering power, when prepared by different processes.

Weber gives five different mixings, the colour becoming darker as we proceed from numbers one to five.

Of the above, No. 1 gave hard and brittle lumps, the various grades passing to a flocculent and spongy condition on reaching No. 5. One of the causes of these differences is due to the diminishing acidity as we pass from No. 1 to No. 5 chromes. Free nitric acid causes chrome to swell and become spongy, and as this swelling is in proportion to the amount of acid present, if lead nitrate is used in place of the acetate, it will be found that No. 1 chrome will yield a very bulky precipitate, whilst No. 5 will be heavy and of a close texture.

ORANGE CHROMES

Orange chromes and chrome reds are produced from the same materials as are used in producing chrome yellows. Orange has the formula $Pb_2\ (OH)_2\ Cr\ O_4$ chrome indicating that basic lead acetate should be used. Neutral lead acetate is capable of taking up further quantities of lead oxide to form basic lead acetates with varying amount of lead oxide. A very good way of preparing orange chrome is as follows:—2 Cwt. of Canary-coloured litharge are worked up in a tub with about 10 gallons of water, and then passed through a fine sieve into a vat, to which is then added 60-70 additional gallons of water. Next 6 lbs. of glacial acetic acid is added, and the whole well stirred, then allowed to stand for about 15 minutes, stirring occasionally. 40 lbs. of commercial sulphuric acid sp. gr. 1.84 is then added slowly, stirring all the time. The formation of basic sulphate takes place, rapidly, and if the acid is not added too quickly, the reaction is complete and the product snow-white before the whole acid has been added. The best way to add the acid, is to add half first, stirring well, and allow the mass to stand for half an hour, and then introduce the balance. 60 lbs. of sodium bichromate and 10 lbs. of powdered 98% caustic soda are then dissolved in 12 gallons of water, and when hot, added to the basic sulphate, stirring well. The orange chrome forms quickly, and after due agitation is allowed to stand for some time, and should be quite free from chrome in solution. If, by any chance, an excess of caustic soda has been added and

the solution is yellow in consequence, even after standing, the excess chromate can easily be removed by adding a little sulphuric acid. By allowing the orange chrome to stand, the brightness and colour are much improved. The vat is filled with water and the chrome settles quickly, and washing is soon finished.

In the manufacture of reduced chromes, barytes, china clay, gypsum and diatomaceous earth are used. When using gypsum it is better to make the chrome from lead acetate than nitrate, as decompositions take place in chromes made with lead nitrate move easilly than the former; while diatomaceous earth or kieselguhr is used when it is desired to produce a chrome of lower specific gravity. The following reductions are frequently used:—

I.

Pure chrome	18 parts by weight
Barytes or gypsum	2 ,, ,,

II.

Pure chrome	16 parts by weight
Barytes, etc.	4 ,, ,,

III.

Pure chrome	12 parts by weight
Barytes	88 ,, ,,

These reduced chromes are extensively used in the cheaper grades of ready mixed paints.

—WAX PENCILS

WAX pencils are used by students in colouring maps and pictures. These have an advantage over the artist's water colours because these can be applied more comfortably than the water colours. The wax pencils can be used simply by rubbing over the paper whereas the water colours should have to be applied with paint brushes moistened with water.

RAW MATERIALS

The raw materials necessary for making wax pencils are:—

Stearic acid (double pressed) hard or extra hard paraffin wax; and suitable mineral pigments.

TOOLS REQUIRED

The tools required are as follows:—

1. Gun metal moulds.
2. Wax melting pots or pans.
3. Ladles, small saucepans for pouring the melted material into the moulds.
4. Weighing scales.
5. Oven or stove.

TYPICAL RECIPES

In making wax pencils it is necessary to weigh out the base first and then any one of the pigments for a particular colour with proportions as specified in the recipe. For other colours the pigment may be changed.

BASE

Stearic acid (Double pressed)	65 lbs.
Hard Paraffin Wax	35 ,,
	100 lbs.

To this base any one of the pigments as stated may be added to produce the required shade.

Colour.	Pigment.	Quantity.
Black	Carbon black	6 lbs. 6 oz.
Blue	Prussian blue	7½ ,,
Orange	Chrome Orange	25 ,,
White	Lithopone	34 ,,
Yellow	Chrome yellow light	12½ ,,
Brown	Burnt umber	6¼ ,,
Red	Red oxide or venetian red	12½ ,,
Rose pink	Red oxide	4 ,,
	Lithopone	10 ,,
Dark Green	Green A	12½ ,,
Violet	Purple	12½ ,,
Light Green	Extra light green	12½ ,,
Golden Ochre	Yellow oxide	8 ,, 11 oz.
Grey	Lamp black	2 ,, 9 ,,
	Lithopone	25 ,, 13 ,,
Burnt Sienna	Burnt sienna	17 ,, 10 ,,
Vermillion Red	Vermilion	18 ,,
Cobalt Blue	Cobalt blue	12½ ,,

First of all weigh out the stearic acid and hard paraffin. Put them into the pan. Apply gentle heat and when melted the specified amount of finely powdered pigment is incorporated into the mixture. Stir vigorously with a ladle. When thoroughly mix, remove the pan from the fire but continue stirring gently so that the pigment which is a insoluble material, may not sink to the bottom of the molten mass. As the temperature falls, observe that the mass becomes thicker and thicker. When it is found that the pigment will keep floating and there is no chance of its being sunk to the bottom of the vessel pour the mass into the gunmetal moulds

by means of saucepans as quickly as possible. Allow the mass to cool and solidify. Then take them out of the mould and proceed to make another set of preparation by altering the pigment.

In this way prepare the wax pencils of all the different sets, next assort and put in cartoons.

MUSEL TYPE WAX PENCILS

BASE

Stearic acid (Double pressed)	65 lbs.
Hard paraffin wax	35 "

For every 100 lbs. of the above ba mix one of the pigments in the pr portion as stated in the list:—

Colour.	Pigment.	Quantity.
Middle Blue	Peacock Blue	17 lbs. 9½ oz
	C. P. Lincoln Toner	
Maximum Purple-Blue	C. P. Milori Blue	8 " 11 "
Middle Purple-Blue	Ultramarine Blue	1 lb.
Maximum Green	Green 8791 (Kohnstam)	8 lbs. 11 "
Middle Red	Van Dyke Brown	2 " 11 "
	Para Red	1 lb. 10 "
	Lithopone	2 lbs. 2 "
Middle Green	Green 8791 (Kohnstam)	5 " 6 "
	Black Lake	2 " 2½ "
Middle Yellow	Mexican Yellow	10 " 2 "
	Black Lake	1 lb. 11 "
Maximum Yellow-Red	Chrome Orange	25 lbs. 3 "
	Permatone Orange (United)	1 lb. 4 "
Maximum Purple	Magenta	4 lbs. 12 "
Maximum Red	Red 1897 (Lavenberg)	11 "
Maximum Red-Purple	Red Purple Lake 2128 (Lavenberg)	3 " 8½
Maximum Yellow	Primrose Yellow	12½ "
	Chrome Yellow Light	12½ "
Maximum Blue	Salisbury Blue (United)	11 "
Black	Carbon Black	6 " 6 o
Grey	Lampblack	2 " 9
	Lithopone	25 " 13
Maximum Green-Yellow	Light Chrome Green	11 "
Middle Green-Yellow	Light Chrome Green	5 " 6
	Black Lake	2 " 3
Middle Yellow-Red	Persian Orange	2 " 11
	Black Lake	8½
	Lithopone	5 " 6½
Middle Blue-Green	Peacock Blue	1 lb. 8½
	Green 10-7500 (United)	13
	Black Lake	9
Maximum Blue-Green	Peacock Blue	3 lbs. 2
Middle Purple	Green 10-7500 (United)	1 lb. 9
	Purple Lake	4
	Red Lake	2
Middle Red-Purple	Lithopone	7½ lbs.
	Para Red	2 " 3
	Indian Red	1 lb. 2
	Black Lake	2 lbs. 3
	Lithopone	5 " 6

Phenols From Hydrogenation Oils.

THE industrial demand for phenols has increased to such an extent that the old sources ceased to be adequate and the development of new sources daily became more necessary. A potential source may be provided by the phenol-containing waste liquids from coke plants, low temperature carbonisation plants and hydrogenation plants. The phenols from refining hydrogenated petrols also provided a rising source of materials as hydrogenation plants were extended. Yet even these new sources were not nearly sufficient to satisfy the ever-growing demand.

Three processes were tried at Lenna in Germany and are described in a recent issue of CHEMICAL AGE which is a translation of a paper on this subject by Dr. Bemann, of the Ammoniakwerk, Merseburg.

SYNTHETIC PRODUCTION.

During the Second Great War Germany was obliged to consider an extension of the synthetic manufacture of phenol. The main drawback was that the raw material, benzene, was not available in unlimited quantities. Moreover, no phenol homologues, like cresols and xylonols, are produced by this method. However, large quantities of ready-made phenols were contained in the low temperature carbonisation tars and in certain hydrogenation products. But the low temperature carbonisation tars are not suitable for extraction in the form in which they are commercially found, since they form emulsions with the extraction liquids, which are difficult to break. The light fractions of the tars are, however, often easy to use. These fractions, with boiling points generally between 200 and 300°C., have a density and viscosity low enough to permit the rapid settling of the extraction liquids. Also, they contain the valuable low-boiling phenols in enriched proportions compared with the tar, so that, for the recovery of a given quantity of phenols, only a comparatively small amount of liquid need be worked up. This correspondingly reduces the size of the plant required.

Most l.t. (low temperature) carbonisation plants deliver their product to the hydrogenation works in the undistilled state in which it is collected. However, in many l.t. carbonisaton plants the collection of the material itself involves a certain amount of fractional condensation of the tar. The main bulk of the material is obtained as a high-boiling thick tar, and a small portion of the total product accumulates as a middle oil-like thin tar and as a light oil. Quite often these separate products immediately re-mix together and in some cases this is only done at the hydrogenation plant.

LIGHT CONDENSATES.

In general, no difficulties are encountered in the dephenolation of the light products before they are mixed with the thick tar. The boiling ranges of the individual fractions overlap considerably, so that the thick tar contains certain quantities of the low-boiling constituents which yield valuable phenols. However, the main bulk of the phenols is found in the light condensates in enriched proportions, so that, according to the nature of the coal, the l.t. carbonisation process used, and the conditions of condensation, about 5 to 15 per cent low-boiling phenols are obtained, together with varying amounts of higher-boiling acid oils.

EXTRACTION PROCESS.

The varying ratio of phenol to cresols depends mainly on the nature of the coal. For instance, most brown coal tar oils contain considerable amounts of phenol. The thin tars and light oils from l.t. carbonisation plants may often be used for the recovery of phenols by suitable extraction medium process. They are easily and rapidly separated from the extraction medium, especially if they are worked up in the state in which they are collected, so that they have not been aged or brought into contact with the air. However, especially at those l.t. carbonisation plants which used old-fashioned methods, products were found which formed disagreeable emulsions with the extraction liquids and were thus unsuitable for dephenolation. Preliminary tests were therefore necessary to ascertain whether the products of a given plant were suitable for extraction.

Apart from the l.t. tars, other potential sources of phenols were in certain oils produced by the direct hydrogenation of coal. These are formed in the liquid phase and represent an intermediate product in the production of fuel. They are only partially saturated with hydrogen, and in addition to nitrogen-and-sulphur containing compounds, among them low-boiling phenols. To obtain useful fuels the liquid phase oils must be further hydrogenated in the vapour phase. For this purpose the liquid phase oils must first be separated into distillate and residue in a manner similar to the hydrogenation of tar oils. This distillate resembles the tar distillate so far as the content of phenols, the viscosity and the density are concerned, but for the purpose of phenol recovery it presents an even more suitable starting material.

HYDROGENATION OIL

The coal liquid phase oil which has been submitted to treatment with hydr gen is considerably less contaminated w the materials interfering with extracti such as emulsion formers and carboxy acids. Moreover, calculated on the ba of the original phase, hydrogenation is a far richer source of phenols than the tar. It has been shown that with co 73 times as much phenol-cresol mixtu is obtained by pressure-hydrogenation is obtained by high temperature cokin Similar, though not quite so arresting, the relation between phenols obtained l.t. carbonisation and hydrogenati Direct hydrogenation of brown coal gi 10 to 20 times as much phenols as d its l.t. carbonisation. Phenols can t be obtained from coal hydrogenation not only more easily, but also in con derably greater quantities than from tars.

At Leuna an attempt was made devise a process in which the pure aci oils could be continuously recovered fr the hydrogenation oils. It was desira that the recoverd oils should be comple ly soluble in dilute lyes; that is, free neutral oils. Moreover, only the phen were required to be extracted from oils, which covered a fairly wide boil range and, in addition to the valua low-boiling phenols, also contained m or less large quantities of higher-boili acidic compounds. Thus the extracti agent should, if possible, act selective The methods tried at Leuna were the h water process, the sodium sulphide p cess, and the caustic soda counter-curr process.

The hot water process uses as the traction agent water at temperatures which the solubility of the phenols high. The subsequent separation depe on differences in solubility with temp ture. The water is saturated at ab

250°C. The oil-water vapour pressure relations prevailing give a working pressure of about 50 atmospheres. The most suitable quantity ratio is 2:1 of water to oil.

To make the process more economical a good heat exchange is desirable. An orific mixer is used and other instruments are: a preheater each for oil and water: separate coolers for oil and water; and high and low temperature separator. Water is circulated continuously, and for the recovery of the phenols, use is made of the 23 gm. solubility difference between 35 gm./ litre at 250°C., and 12 gm./ litre at 25°C.

Before the crude extract oil may be used as phenolic oil it must undergo further treatment. First, it is topped and the higher boiling equipments are removed as residue. Its quite considerable content of neutral oil is then removed, after which it is ready for use. From the operating point of view this process has proved quite satisfactory, but it leaves much to be desired in the purity of the phenol. At 250°C. water is very much less selective than at room temperature, and its affinity for neutral oils rises far more steeply with temperature than does its affinity for phenols.

SULPHIDE PROCESS.

The sulphide process is based on the fact that at about 100°C. phenols will dissolve in sodium hydrosulphide lye, with evolution of H_2S, and that the phenols may later be regenerated from the solution by gassing with H_2S. Thus, phenolcontaining oils are extracted in an agitator, or similar apparatus, with a solution of sodium sulphide at about 100°C., the dephenolated oil being then separated from the phenolic lye by allowing it to settle in the separating vessel. Finally, the phenolic lye is treated with H_2S at about 50°C. in packed columns, separating off the dissolved phenol in the form of crude phenolic oil. The lye regenerated by the H_2S in recycled.

The hydrogen sulphide for the process is pressurised from a gasholder into the gassing column through a blower. After passage through the towers the unabsored gas is united with the H_2S liberated during the extraction, and is passed back to the gas holder. Both lye and gas thus form closed systems. The only losses are due to leakage and solution of the gas and the lye in the end products.

The crude phenol oil is practically free of neutral oil and can be separated simply by distillation. It contains considerably more low-boiling phenols than the phenol oil obtained from the same starting oil by the hot water process. This is because the weakly alkaline sodium sulphide lye selectively dissolves the more strongly acid low boiling phenols. For instance, if in the oil to be phenolated the ratio of low-boiling phenols to high-boiling acids oils is 1:4, then in the crude phenol oil obtained this ratio will change to 1:2.

The third process is a development of the well-known method of extracting phenols from phenolic oils with caustic soda, treating the carbolate liquor thus formed with CO_2 to precipitate the dissolved phenols, and then causticising the carbonate lye, with lime. The lye generated in this way is then re-circulated to the extraction stage.

The further development consists in effecting the extraction counter-current wise. It was found that, instead of using an extracting column, the process gained by being operated on a cascade-typecounter-current basis. Three stages are generally sufficient. As compared with the single-stage stirring, considerable economy of lye is achieved, since the lye selec-

tively dissolves the more strongly acid low-boiling phenols, while the more weakly acid high-boiling oils remain undissolved. The selective action of the lye is evident, even in the low boiling phenols extract, for phenol in its turn is dissolved preferentially to the cresols and the xylenols.

EVAPORATION PLANT

This process also produces phenolic oils practically free of neutral oils, so long as the caustic soda lyes used are not stronger than 10 per cent. If the phenol oils are required to be absolutely free of neutral oils, and completely soluble in dilute lye, then an evaporation section for purifying the phenolate lye must be incorporated. Should the oil to be dephenolated contain appreciable quantities of dissolved acid gases like CO_2 and H_2S, these would require to be removed before extraction, by treatment with an inert gas.

The caustic soda stepwise countercurrent process operates under ordinary temperature and pressure. The consumption of energy is restricted to the fairly low consumption of the pumps. No corrosion problems arise. The extraction plant is not expensive, consisting mainly of thin-walled containers and ordinary centrifugal pumps. The only unsatisfactory feature of the process is the comparatively complicated and expensive regeneration of the carbolate lye by causticising with lime. It was suggested that the American proposal (Pat. App. K. 147, 049, Koppers Co.) to decompose the carbonate lye by electrolysis might be a better solution of this problem.

DETRIMENTAL IMPURITIES

As regards the effect of dephenolation on the subsequent treatment of the tar oils or the hydrogenation oils, this generally consists of hydrogenation in the vapour phase over solid catalysts because any impurities in the oils, especially inorganic non-volatile materials, are detrimental. The dephenolated oils must be carefully freed of entrained lye by allowing them to settle or by centrifuging. Oils containing dissolved inorganic materials, such as alkali phenolate, must be thoroughly washed with water or redistilled.

The reduced phenol content of the oils may influence the hydrogenation itself. For example, the hydrogen requirement may be less than that of the untreated oil, since the highly unsaturated phenols are absent. The heat of the hydrogenation reaction also will be less, which in certain circumstances may be advantageous. Finally, for the action of certain hydrogenation catalysts a reduced content of phenols may be beneficial. Against these advantages must be set the fact that fuels produced from dephenolated oils have a slightly lower knock rating.

Apart from the valuable low-boiling phenols, the crude oils contain considerable quantities of water, benzene, high-boiling acid oils and, as with the oils extracted with lyes, traces of alkali. These substances are removed by distillation water and benzene being the first runnings, and the low-boiling phenols the main fraction. The high boiling acid oils together with the inorganic residues, remain as distillation residue. The main fraction is either used as such or divided by further distillation into phenol, cresols and xylenol mixture.

The quality of the phenols obtained from l.t. tars and from liquid phase hydrogenation oils is inferior to that of phenols obtained from h.t. coal tar, mainly on account of the comparatively high content of sulphur compounds. Their purity, however, is sufficient for many purposes.

Modern Dental Preparations

IN recent years there has been new interest in dental pharmacy, and a great deal of attention is now given this area of pharmaceutical practice. The dental profession itself has changed considerably in its outlook on medicinal agents. Once the dentist was almost solely a skilled operator using very few drugs. To-day a wide number of drugs has been employed both to increase the efficiency and reduce the pain, anxiety and discomfort of the patient.

Many pharmacists are now seeking to interest dentists in using their compound facilities, and they are, therefore, interested in dental formulas. The following extract from PHARMACY INTERNATIONAL will assist the pharmacists with recipes of new kind of products used by the dentist and their formulation.

ABRASIVE PASTE

Powdered pumice	24	Gm.
Starch glycerite	36	Gm.
Methyl salicylate	2	c.c.
Carmine	0.13	Gm.
Amaranth solution (1%)	1.0	c.c.
Powdered pumice	60	Gm.
Starch	12	Gm.
Methyl salicylate	0.5	c.c.

ABRASIVE CAPSULES

Mix and make 60 capsules. Contents of one or two mixed with glycerin or water to give a paste before using.

DENATURE CLEANERS

I.

Trisodium phosphate	120	Gm.
Cinnamon oil	0.3	c.c.
Amaranth solution (1%)	2.1	c.c.

Dissolve about 1-2 Gm. in a glass of water and use with brush. Do not leave denture in solution over night (cellulose acetate dentures are decomposed by alkaline solutions).

II.

Calcium carbonate	75	Gm.
Tri-isopropanolamine	250	Gm.

Water, sufficient to make a paste.

Brush on dentures thoroughly, then rinse with water. (Suitable for cellulose acetate type of denatures).

DISCLOSING SOLUTIONS

These are used to paint the surface of a tooth in order to stain and render bacterial plaques and foreign matter visible.

I.

Iodine	3.3	Gm.
Potassium iodide	1.0	Gm.
Zinc iodide	1.0	Gm.
Glycerin	20.0	c.c.
Water	20.0	c.c.

II.

Zinc iodide	12.0	Gm.
Iodine	20.0	Gm.
Water	8.0	c.c.
Glycerin	40.0	c.c.

This is known as Talbot's Iodo-Glycerol, and is used as a disclosing solution and in the treatment of gingivitis and periodontitis.

TROPICAL ANESTHETICS

Used to anesthetic gums before using sypodermic needle or before scaling teeth.

I

Ethyl aminobenzoate	5.0	Gm.
Benzyl alcohol	25.0	c.c.
Ethyl alcohol	70.0	c.c.
Ethyl aminobenzoate	1.5	Gm.
Chlorobutanol	1.5	Gm.
Methyl salicylate	0.3	c.c.
White wax	3.0	Gm.
Wool fat, to make	30.0	Gm.

II.

Ethyl aminobenzoate	8.0	Gm.
Clove oil	20.0	c.c.
Benzyl alcohol	40.0	c.c.

FOR HYPERSENSITIVE DENTIN

I.

Silver nitrate	3	Gm.
Ammonium hydroxide solution (28%) and Water, of of each sufficient to make	5	c.c.

Place the silver nitrate in a test tube and add 1 c.c. of water. Heat over flame until dissolved, but do not boil. Allow to cool, then add ammonium hydroxide slowly until black precipitate which first forms almost dissolves. Filter and preserve in amber bottle.

This solution is applied to the sensitive area, and then reduced with eugenol or 10 per cent formaldehyde. It should be used only on posterior teeth, since it stains.

II.

Ethyl oxide	20	c.c.
Thymol	12.5	Gm.
Alcohol	10.0	c.c.

This is known as Hartman's solution. It is applied at intervals to the dry cavity while operating to reduce pain.

III.

Ethyl aminobenzoate	3.5	Gm.
Benzyl alcohol	17.5	c.c.
Clove oil ..	9.0	c.c.

Applied to sensitive cavities while grinding or drilling.

CAVITY VARNISHES

These are used to seal deep-seated cavities after preparation for filling.

I.

Rosin	4.0	Gm.
Thymol	0.5	Gm.
Menthol	0.13	Gm.
Chloroform, to make	30.0	c.c.

Mix and filter

II.

Rosin	2	Gm.
Chloroform, to make	30	c.c.

Mix and filter

III.

Rosin	2	Gm.
Sodium carbonate, monohydrated	0.5	c.c.
Acetone	30	c.c.

IV.

Mastic	9	Gm.
Peru balsam	9	c.c.
Chloroform, to make	30	c.c.

ROOT CANAL STERILIZATION

I.

Formaldehyde solution	4.0	c.c.
Creosol	4.0	c.c.

II.

Creosol	4	c.c.
Formaldehyde solution	3.5	c.c.
Geranium oil	1.0	c.c.
Alcohol	1.5	c.c.

Mix and filter clear.

III.

Betanaphthol	4.0	Gm.
Alcohol, to make	30.0	c.c.

PULP CAPPING PREPARATIONS

I.

Thymol	0.2	Gm.
Calcium phosphate	20.0	Gm.

Eugenol, to make a thin, creamy paste.

II.

Thymol iodide	1.0	Gm.
Dicalcium phosphate	4.0	Gm.

Mix and before using and eugenol to give a thin paste.

III.

Fine metallic silver	6.0	Gm.
Zinc oxide	9.0	Gm.

Mix and before using add eugenol to give a thin paste.

DRY SOCKET PASTES

For the treatment of pain due to "dry socket" use the following extractions.

I.

Eugenol	1.2	c.c.
Peru balsam	6.0	Gm.
Acetylsalicylic acid	15.0	Gm.
White Wax	6.0	Gm.
Wool fat, to make	60.0	Gm.

II.

Ethyl aminobenzoate	3	Gm.
Thymol iodide	1	Gm.
Menthyl salicylate	0.3	c.c.
Hydrous wool fat to make	30.0	Gm.

III

A

Zinc oxide	5	Gm.
Powdered rosin	4	,,
Sulfanilamide	1	,,

B

Clove oil	4	cc.
Liquid petrolatum	6	,,

Mix A with B to make a stiff paste.

IV

Guaiacol	3.0	Gm.
Ethyl aminobenzoate	3.0	,,
Peru balsam	9.0	,,

Mix.

FOR VINCENT'S INFECTION

Sodium perborate	60	Gm.
Sodium bicarbonate	30	,,
Methyl salicylate	4	,,

Mix. One teaspoonful in a glass of rm water every hour.

PENICILLIN PASTILLES

Butyl parahydroxy benzoate	50	Mg.
Distilled water	55	cc.
Gelatin	25	Gm.
Sucrose	25	,,
Penicillin sodium	100,000	Oxford its.

Dissolve the butyl parahydroxybenzoate in 50 cc. of boiling distilled water. Place on a water bath so as to maintain a temperature as near 100°C. as possible, and slowly add the gelatin with constant stirring. Add the sucrose and continue to heat on the water bath with occasional stirring until the gelatin is dissolved; this usually takes about twenty minutts. Remove from the water bath and allow to cool to 50°C., then add the penicillin sodium previously dissolved in 5 cc. of cool distilled water. Stir until thoroughly mixed and immediately pour into lubricated moulds and allow to cool; the cooling may be hastened by placing in a refrigerator.

LIQUID DENTIFRICE

Powdered soap	7.2	Gm.
Saccharin	0.24	,,
Amaranth sol'n (1%)	1	cc.
Cinnamon oil	0.6	,,
Peppermint oil	0.6	,,
Clove oil	1.2	,,
Alcohol	90	,,
Distilled water to make	120	,,

TOOTH POWDER

Powdered soap	50	Gm.
Precipitated calcium carbonate	935	,,
Soluble saccharin	2	,,
Peppermint oil	4	cc.
Cinnamon oil	2	,,
Methyl salicylate	8	,,

DENTURE ADHESIVES

Powdered targacanth	22.5	Gm.
Powdered karaya	7.5	Gm.
Sassafras oil	0.5	c.c.
Powdered tragacanth	60	Gm.
Powdered acacia	60	Gm.
Sodium benzoate	0.4	Gm.
Anise oil	0.2	c.c.

TOOTHACHE DROPS

To be placed in cavity on a small pledget of cotton, and then covered with

dry cotton for the temporary relief of toothache.

Clove oil	15	c.c.
Phenol, liquefied	90	c.c.
Amaranth solution (1%) to colour Glycerin	180	c.c.
Creosote	50	c.c.
Clove oil	50	c.c.
Chloroform	50	c.c.
Phenol	2.5	Gm.
Menthol	2.0	Gm.
Eugenol	1.0	c.c.
Camphor	0.5	Gm.
Chlorobutanol	25	Gm.
Clove oil, to make	100	c.c.

TOOTHACHE WAXES

To be warmed slightly until plastic, and then pressed lightly into a cavity for the temporary relief of toothache.

Yellow wax	50	Gm.
Lard	10	Gm.
Clove oil	20	c.c.
Creosote	20	c.c.
Paraffin	4	Gm.
Burgundy pitch	4	Gm.
Clove oil	2	c.c.
Creosote	1	c.c.

ZINC AND EUGENOL CEMENT

I.

Zinc acetate	0.5	Gm.
Zinc stearate	1.0	Gm.
Zinc oxide	70.0	Gm.
Rosin	28.5	Gm.

II.

Eugenol	85	c.c.
Cottonseed oil	15	c.c.

Powder the rosin and incorporate it with about an equal weight of zinc oxide until thoroughly mixed. Sift the mixture in a sieve of not less than 100 mesh. Regrind the material which does not pass through the sieve with more of the zinc oxide and sift again; repeat the process until all the material readily passes through the sieve. Thoroughly mix the zinc stearate and zinc acetate with a portion of the zinc oxide and pass through a 100-mesh sieve. Thoroughly mix the two mixtures with the remainder of the zinc oxide.

Thoroughly mix the liquids together in the proportions specified.

To prepare the cement, mix 10 parts of the Powder with 1 part of the Liquid to a thick paste immediately before use.

NOTE: The amount of Liquid may be varied to give any desired consistency.

After it is mixed and placed in a cavity, this material solidifies into a cement that relieves toothache. It is often used as a temporary measure by the dentist.

—TRANSFER PAPERS

PRINTING directly on materials other than paper by typographic, planographic or intaglio processes is somewhat difficult. In many cases it would be impractical to set fabrics or leather, because of area or thickness, in printing presses. In the case of objects made of glass, wood, metals or ceramics, particularly those which do not possess flat surfaces or which are relatively large, the task of direct printing from presses seems tremendous if not impossible of achievement. To avoid these obstacles, the transfer process of printing has been developed. This comprises pointing or painting designs, patterns, pictures or textual matter upon a temporary base and later transferring the printed material from the temporary to a permanent base.

This temporary bases may be prepared from paper, fabric or other substances that have flat surfaces and are of convenient size for printing, storing, transportation or other handling. However, paper apparently is employed in a large number of instances than other materials.

To prepare this sort of transfer, thick unglazed papers are selected for the temporary bases on which transfer designs are to be placed. Usually these are treated with modifying agents before imprinting the designs. In this way, efficient transposition of the design to a permanent base can be brought about. Thus, in general, to minimize ink absorption, temporary transfer bases should be impermeable to the inks employed. Materials proposed for treating temporary transfer bases prior to printing include, among others, starch, gums, natural and synthetic resins, waxes and glycerol.

A suggested method for preparing paper backing sheets involved coating the latter with a starch solution, followed by addition of dextrin thereon. The whole is covered, before it sets, with a sheet of performed cellulosic material such as cellophane, which received the print. Any tendency toward lumpiness on the part of the printed marking is thus precluded. Stacking of such transfer sheets often results in offsetting from a base to the back of the one beneath it. Embossing of the back of starch-dextrin treated sheets has been proposed to overcome this difficulty. Also chalk mixtures bonded to the back of the transfer base by adhesives are stated to be effective in obviating offsetting. In some instances a solution of citric or tartaric acid has been added to the starch-treated transfer base. After the latter has dried the design is printed directly upon this surface. When lithographic processes are to be employed in printing transfer bases, markings might be placed upon unsized paper that previously had been coated with starch and dextrin. Subsequently the whole was covered over with an alcoholic solution of sandarac, lac (shellac) and elemi gums. Because of the tendency of unsized paper to be affected by changes in temperature and humidity, sized paper has been utilized in making transfers. The paper, after application of a "releasing liquid" (a term employed to designate a base for receiving printed matter, which base later can be removed by water), was overdextrin and lacquer, the latter receiving the ink. The releasing liquid consisted of a blend of an aqueous solution of sulphonated castor oil (10 per cent) and sodium lauryl or stearyl sulphate (0.5-2.0 per cent).

A blend reported to prevent penetration of transfer inks into paper bases has

been suggested. A mixture of 12 parts dextrin and 2 parts starch, incorporated in boiling water, was combined with a composite of 400 parts sodium carbonate and an equal amount of colophony in water. Two hundred parts egg albumin in water, 200 parts sulphur, 400 parts gum arabic, and 2000 parts glycerol were then added. Employment of gum arabic as a foundation for transfer inks has been stated to yield a compound suitable for carbon papers. When sized paper is utilized as base, the transfer ink may be printed directly upon the former, and the design then coated with gum tragacanth or gum karaya. The latter substances were reported to increase the fastness of colours on fabrics on transference. Gum-coated transfer bases printed with inks containing cellulose esters or ethers together with alcohol-soluble resins have been proposed. Such inks were suggested for transferring designs to glass, wood or metal surfaces. Ingress of colour blends containing amyl acetate, rosin, linseed oil, nitrocellulose and bronze powder into paper bases was said to be obviated by covering the surface of the paper with dextrin. Also, mixtures of dextrin and glycerol have been utilized in overspreading paper bases intended for transfer prints. On the other hand, the glycerol-dextrin mixture may be applied, together with pigment and a small proportion of gum, to the temporary base. In this manner, an alcohol-soluble ink that would not penetrate paper bases was stated to have been secured.

Because of the rapid action of water upon veneer wood, transfers for the latter are usually prepared from water-insoluble materials. For example, backing paper was overspread with three coatings of water-resistant material and the centre film, which was insoluble in solvents for the outer coverings, carried the transfer design. The ink-carrying lacquer comprised gum sandarac and rosin in alcohol, and the outer and inner films were a blend of Cumar and dibutyl phthalate in ethyl acetate, ethylene glycol, butyl ether, and a petroleum distillate boiling in the range 99-116°C.

Cellulose derivatives are used as paper-backing films for some types of transfers. With ceramic transfers, when the ware is fired after the transference operation, plastic materials that will burn away have been proposed. In this manner the transfer can be placed upon the final backing without removing the temporary base, since the latter will burn away during firing of the ware. In one instance paper was coated with collodion on which the design was printed with partially fused pigments. Or the marking may be placed upon a collodion film, with a clear varnish, and a charge of dry colours then blown or brushed on the outlined figures. Also nitrocellulose films may form a permanent part of the transfer. Thus, gummed paper was overspread with a nitrocellulose film, and the transfer printed thereon. The whole was covered with a composite of varnish, linseed oil, zinc oxide and lithopone. This coating mixture was stated to be inert toward the nitrocellulose film and ink, and to furnish an opaque background for the design on transference. Cellulose-base lacquers were reported to be applicable as supporting films for inks containing aluminium. A stated advantage of such films was that they afforded protection to the transfer against weathering effects, and at the same time were clear enough to completely expose the transfer design to view. When aluminium or bronze powders were employed in transfers, it was suggested the design be placed upon a nitrocellulose film with varnish, and the powder blown or brushed on the

latter. The whole was coated with a second layer of nitrocellulose lacquer on which the design was printed in ink. To furnish an opaque background for the marking, white ink was placed over the second film. A third nitrocellulose film was added, and a gummed adhesive incorporated in the outside film.

Certain types of waxes have been employed in treating temporary transfer bases prior to printing of the design. In the preparation of a pressure-transfer a sheet of transparent paper was coated with paraffin wax, and the pattern placed on the wax with ink containing a non-drying oil. Also, foundation materials may include rosin together with wax. The latter were reported to be applicable with marking blends of bronze and nitrocellulose in a volatile solvent. After printing, the ink and base may be overspread with a layer of wax and rosin in which a gum or glue sizing has been admixed. The rosin may be substituted by paracoumarone. For example, a composite of Chinese insect wax and paracoumarone was used to coat glassine paper, and a design placed thereon with a nitrocellulose-metallic powder marking compound. Shellac sizing subsequently was added to the print. Instead of printing the design on a wax coating, the pattern may be stamped out from a cellulose ester film, attached to the wax surface, and a coating of gum dammar applied as adhesive.

Albumin and similar substances have been suggested as components of transfer prints. Thus, paper backing intended as a temporary base for inks was impregnated with an admixture of albumin, a water-soluble gum, calcium chloride and glycerol. The admixture was reported to be efficient in preventing penetration of soap and wax-containing inks into the paper base. Addition of ammonium or sodium alginate to starch and dextrin was stated to furnish a product applicable for treating glassine paper prior to printing. Such coatings were said to aid in securing smooth ink impression on the transfer base.

Impregnation of paper backings with gelatin has been advocated. For example, a temporary paper base was coated with gelatin, and a layer of paraffin wax then added. Such procedures were said to close the pores and smooth over the uneven portions of the paper. The whole then was covered with a film of nitrocellulose on which the design was placed. On the other hand, the wax may be omitted, and the pattern printed directly on the gelatin layer, which subsequently is treated with a cellulose lacquer. Other materials may be included in gelatin coatings. Thus, an aqueous solution of gelatin, potassium dichromate and glycerin has been proposed. Application of this composite to paper was reported to make the base impermeable to wax. The latter was utilized, together with gum thus and shellac, in preparation of a film to carry the inked design.

PHARMACEUTICAL RECIPES

ACETUM CANTHARIDIN (B.P.C.)

Cantharidin	4½	gr.
Glacial acetic acid	2	fl. oz.
Acetic acid to produce	20	„

Dissolve the cantharidin in the glacial acetic acid with the aid of gentle heat; cool and add sufficient acetic acid to produce the required volume.

DYSPEPSIA POWDER

Ajowan Seeds, powdered	1	oz.
Rock Salt	1	„
Asafoetida (Hing)	1	„
Myrobalans	1	„

Mix.
Dose 10 to 20 grains.

SPLEEN POWDER

Ginger (Sunth)	10	grains
Rhubarb (Raven Chem)	5	„
Ferri Sulph	2	„
Quinine	2	„

Mix and make one packet. This is for one dose.

AUTOMIZER LIQUID FOR SICK ROOMS

	parts by weight
Eucalyptol	10
Thymol	5
Lemon oil	5
Lavender oil	5
Rect. spirit	110

Mix. To a pint of water mix a teaspoonful for evaporation.

SPIRIT OF SAL VOLATILE

Ammonium carbonate	100	grms.
Strong solution of ammonia	200	c.c.
Oil of nutmeg	15	„
Oil of lemon	20	„
Alcohol	3000	„
Distilled water	1500	„

Place the oil of lemon, oil of nutmeg, and alcohol with the distilled water in a retort; distil 3000 c.c.; then distil and separately collect an additional 225 c.c. Place the latter, together with the ammonium carbonate and the strong solution of ammonia in a bottle holding rather more than 500 c.c. securely cork the bottle and gently warm it in a water bath to 60°C. shaking from time to time until all the salt has dissolved. Filter resulting solution when cold through cotton wool and gradually mix the filtrate with the portion first distilled.

CONCENTRATED DILL WATER

Oil of dill	20	c.c.
Alcohol (90 p.c.)	600	„
Distilled water, sufficient to produce	1000	„

Dissolve the oil of dill in the alcohol and add sufficient distilled water in successive small quantities to produce 1000 c.c. shaking vigorously after each addition. Add 50 grams of powdered talc. and shake; set aside for a few hours, occasionally shaking; filter.

Dose: 5 to 15 minims.

LIQUID EXTRACT OF KALMEGH

Kalmegh	500	grams.
Oil of fennel	2	millilitre.
Oil of ajowan	5	„

Alcohol (90 per cent) a sufficient quantity.

Boil the Kalmegh with 1500 millilitres of water for half an hour and strain. Add further 1500 millilitres of water, boil for half an hour strain. Repeat the process until a total of 2000 millilitres of the extract are collected. Mix and concentrate to 250 millilitres on the water bath. Dissolve the oil of ajowan and oil of fennel in 200 millilitres of alcohol (90 per cent) and add this alcoholic solution to the concentrated extract.

Dose 8 to 15 minims.

CASTOR OIL EMULSION

Castor oil	2	oz.
Powdered acacia	6	dr.
Peppermint oil	3	mins.
Powdered tragacanth	16	gr.
Saccharin	4	„
Glycerin	3	dr.
Cacao	2	„
Water to make	4	oz.

Boil the cacao with glycerin and water for 5 minutes. Make a mucilage of acacia with 4 dr. of the cacao mixture and gradually add the castor oil and peppermint oil by shaking. Continue trituration until emulsified. Then add the remainder of the cacao mixture.

CREAM FOR BURNS

Sulphanilamide	3	parts.
Glycerine	10	„
Groundnut oil	25	„
Lanette wax or beeswax	10	„
Water	52	„

Mix the first two and last three ingredients separately then mix together.

—Recipes for Small Manufacturers

JEWELLERS' ROUGE

Saturate a solution of sulphate of iron (green vitriol) with a solution of oxalic acid. Filter and dry the resulting precipitate of pale-yellow oxalate of iron; place it in an iron dish and expose it to a moderate heat, whereby the oxalic acid will be decomposed and expelled, and a pure sesquioxide of iron will be left. This is very fine and can be used for producing a very brilliant polish upon the finest jewellers' work.

MARKING CRAYONS (GREEN)

Ceresin	8	oz.
Carnauba wax	7	„
Paraffin wax	4	„
Beeswax	1	lb.
Talc	10	oz.
Chrome green	8	„

Melt the first four ingredients in any container and then add the last two slowly while stirring. Remove from the heat then continue stirring until thickening begins. Then pour into moulds. If other colour crayons are desired, other pigments may be used. For example for black, use carbon or bone-black; for blue, Prussian blue, for red, orange chrome yellow.

ARTIFICIAL MUSK

A remarkable oily liquid, having a brown colour, and smelling so like musk that very few noses are able to detect the difference between the natural product and the artificial body, is obtained by a new process. 2 parts of isobutyl alcohol, 3 parts of metaxylol, and 9 parts of chlorate of zinc are heated together for 8 or 9 days at a temperature of about 440 or 450°F in a strong vessel, the pressure inside which speedily rises to nearly 30 atmospheres but gradually declines to about a quarter of that degree of tension, when the whole is allowed to cool gradually. The crude product so obtained is purified by distillation once or twice repeated oily fluid comes over between 220° and 260°F; this when rendered slightly alkaline is the "musk" in question, and it may be diluted with alcohol, for the use of the perfumer, to any desired degree of odoriferous strength.

MUKHBILAS

Coriander seed	1	tola.
Aniseed	1	„
Parsley	1	„
Nutmeg	1	„
Ajowan	1	„
Saffron	1	„
Seeds of cardamom major	1	„
Seeds of cardamom minor	1	„
Cloves	1	„
Dry rose petals	1	„
Chua	1	„
Camphor	1	„

Take one tola each of the ingredients excepting the last two and soak them in good rose water for 12 hours. Then bray them together to a paste form and incorporate chua and camphor.

DRY CLEANING FLUID

Glycol	2	fl. oz
Carbon tetrachloride	60	„
Naphtha	20	„
Benzine	18	„

This is an excellent cleaner that will not injure the finest fabrics.

SOLID BRILLIANTINE

Spermaceti	500	parts.
Castor oil	500	„
Benzoated lard	200	„
Rose oil	1	part.
Rose geranium oil	4	parts.
Petitgrain oil	5	„

Melt the spermaceti and lard over water bath. Then remove from the source of heat and add the castor oil and then the essential oils. Mix and pour in pots.

POMADE FOR BALDNESS

Pilocarpin hydrochlorate	10	grains.
Balsam peru	30	„
Precipitated sulphur	1	dr.
Benzoated lard	1	oz.

Dissolve the pilocarpin in a few drops of water and mix in a mortar with the other ingredients.

BRAHMI OIL

In preparing this medicated oil, sesame oil is generally used. This oil, before being boiled with medicinal substances is first of all heated to deprive it of any water by evaporating. It is then purified by steeping in it the following substances for 24 hours viz., Maddar 1/16 part in weight of oil, turmeric, wood of symplocos racemosa, tubers of cyperus rotundus, a bark called nilaka, the three myrobalans, roots of danus odoratissium, each one sixty-fourth part pavonia odorator and the tender shoots of Pandanus odoratissium, each one sixty-fourth part in weight of the oil. These ingredients in fine powder should be soaked in the oil, with the addition of an equal quantity of water for a day. The mixture should then be boiled till the water is evaporated, and finally strained through clean cloth. To the oil thus prepared dried brahmi herb, is added in the proportion of 4 parts of the herb to 16 parts of oil. The mixture is then boiled till the watery parts are all evaporated. This is then allowed to cool and strained.

—IN THE FIELD OF INVENTION

FIRE FIGHTER

A firehose nozzle, said to make fire "extinguish itself", has been successfully tested in the United States. The nozzle, a new pressure-type device, produces a spray which the fire turns to steam. The steam in turn puts out the fire. The new device, originally developed by the U. S. Coast Guard for combating engine room fires on ships, was described at a recent conference of city fire-fighting instructors in the United States.

The special nozzle breaks up a stream of water into extremely tiny particles that turn to steam when they hit the blaze. The expanding steam forces the remaining water to permeate everything else nearby. By using the new nozzle, less water is required to put out a fire, thus reducing damage from water.

—U.S.I.S.

RESINOUS WOOD ADHESIVES

Tannins extracted from Barks of Acacia mollissima (black wattle), Eucalyptus crebra (narrow leaved red ironbark), Callitris glauca (white cypress pine) and Callitris calcarata (black cypress pine) and from the woods of Eucalyptus redunca (wandoo) and Eucalyptus consideniana have been investigated for their use in the production of wood adhesives.

The rates of condensation of these tannins with 8 per cent formaldehyde were assessed by measuring the gelation times. Calcarata tannin was the most reactive; a 40 per cent solution gave a gelation time of 65 min. at 4.5 pH. C. glauca, A. Mollissima and E. redunca tannins came next in the order of their reactivity. There is a rapid change in gelation time with formaldehyde concentration up to about 10 per cent. Good adhesive strengths are obtained within this range. Reactivity is similar at pH values of 2 and 8.

Adhesives were prepared by two methods. In the first method a resin was prepared by heating a solution of the tannin extract or its alcohol-soluble fraction with formaldehyde in aqueous alcohol. The adhesive was prepared from this resin by adding paraformaldehyde, alkali and filler. The resin has a shelf life of 15 days at 25°C. and of several weeks at 10°C. In the second method the adhesive was obtained by adding paraformaldehyde and filler to an alkaline solution of the tannin. This solution does not gel on standing but some tannins give a precipitate which can be delayed by adding glycerol.

Different formulations were tried for cold-press and hot-press adhesives. Best cold-set adhesives were obtained from A. mollissima and C. calcarata tannins. Compared with commercial resorcinol-formaldehyde and urea-formaldehyde adhesives, these tannins require a short assembly time and have a short pot life. Their bond strengths are lower except that in resistance to boiling water the tannin adhesives are far superior. Satisfactory hot-press adhesives were obtained from A. mollissima, C. calcarata, C. glausa and E. crebra tannins having shear strengths and water resistance similar to the phenolic resins used in industry. They set in a short time at lower temperatures than the phenolic adhesives unless these contain a polyhydric phenol or are catalysed with strong acid. The resinous adhesives require relatively little formaldehyde, the quantity varying from 4 to 8 per cent. on the weight of tannin extract. The drawback of short pot life is offset by the ease and simplicity of preparation.

—JOURNAL OF SCIENTIFIC & INDUSTRIAL RESEARCH.

NEW ALUMINIUM PHOSPHATES BONDING AGENTS

Aluminium phosphates bonding agents for refractories, high temperature cements and refractory paints are being produced in commercial quantities by the Mousanto Chemical Coy., St. Louis, U.S.A. The products, ranging in ratio of aluminium to phosphoric acid from 1.0 to 1.67, and in physical form from dry solids to water solutions of high concentrations, have been given the trade name alkophos. They are said to provide good green strength, making it possible to fire moulded shapes in place to yield high temperature non-slagging refractories.

—CHEMICAL AGE.

A NEW METHOD OF RECOVERY CHOLESTEROL

Recently J. Th. Hakmann has developed a new method of obtaining cholesterol from unsaponifiable part of wool grease by means of addition products. The process is simple and consists in the formation of addition compounds of cholesterol with inorganic metal salts. These addition compounds are separated from the other components by means of a solvent in which the addition compound is not solube. The addition product is then decomposed by water, yielding cholesterol, which is purified by crystallisation.

—JOURNAL OF THE TEXTILE INSTITUTE.

AIR-BUBBLE CONCRETE

Air-Bubble concrete is prepared in conventional mixing equipment. An aerating agency, such as resin powder, is added to the mix to cause it to foam and become porous. The air bubbles constitute up to 30 percent of the volume of the concrete.

According to scientists of the U.S. National Bureau of Standards, where the new concrete is being developed, the many tiny air bubbles enclosed within the material "make the product lighter in weight", a better insulator against heat or cold, and more resistant to water penetration". The air-bubble concrete is 30 percent lighter than ordinary concrete.—USIS.

—FORMULAS, PROCESSES & ANSWERS

BORNEOL OR BHIMSEN KAPUR

2321 A.V.K.N., Karur—Desires to know a method of preparing berneol.

The starting point of this substance is the pure turpentine oil. Take pure turpentine oil and pass through it dry hydrochloric acid gas. The temperature of the mixture should be kept cooled by putting the containing vessel over ice, the solidified pinene hydrochloride is produced.

Next take 10 parts of pinene hydrochloride in a suitable vessel and mix with it 13.8 parts borax and 15 parts water. Heat the mixture under pressure at 220°C for a few hours. Then distil the mixture in steam whereby camphene boiling below 160°C free from chlorine is obtained. Now converse this camphene into borneol. For this purpose take 100 parts camphene; 250 parts glacial acetic acid and 10 parts of sulphuric acid (50 per cent. solution). Heat the vesel to about 60°C with continuous agitation till a perfect solution is obtained (two or three hours). On adding water, isoborneol acetate separates as an oil, which on hydrolysis gives isoborneol. The solution left on cooling produces borneol.

THINNERS FOR CELLULOSE LACQUERS

2390 I.K., Rajkot—Desires to learn a process of Thinners For Cellulose Lacquers.

Acetone	80 parts.
Ethyl Acetate	20 „
Ethyl Lactate	20 „

Mix and being volatile keep in well stoppered bottle.

HONEY JELLY

2457 A.F.C.I., Delhi—Wishes to have a formula of honey Jelly.

Honey	2½ cups.
Water	½ cup.
Fruit Pectin (liquid)	½ pint.

Mix honey and water in the kettle. Bring to full boil as quickly as possible. Add liquid pectin, stirring constantly. Bring to full rolling boil. Remove from fire at once and skim. Quickly pour into hot glasses. Cover with paraffin.

Note:—1 pint = 2 cups = 1½ pound.

BLACK ENAMEL PAINT FOR CYCLES

2458 M.C.I., Jullundur City—Wants a formula of black enamel paint for cycle.

Asphalt	2 lbs.
Boiled linseed oil	1 pint.
Oil of turpentine	4 pints.

Mix the two oils, add the asphalt in small pieces, set aside in a warm place for a week, shaking occasionally then decant the clean fluid.

Benzine may be used in place of turpentine.

GRINDING WHEEL

2132 C.F.W., Batala—Desires to know a good process of making grinding wheel.

Grinding wheels and other abrasive articles are made with latex as the binder for the abrasive material.

Carborundum grains	300 parts.
Rubber (from latex)	100 „
Sulphur	20 „
Accelerator	2 „

Cure: 2 hours at 287°F.

To the latex mixture made from this formula is added a solution of zinc acetate or other coagulant, the mass being stirred until it has a cheese-like consistency. It is then moulded to shape, dried and vulcanized to the hard rubber stage.

Emery cloth or paper can be made from the formula shown to which glue or casein is added to make the binder more adhesive. It is then spread on fabric or paper, dried and vulcanized in dry heat.

MAKING OF DRAGEES

2259 R.J.P., Ahmednagar — Desires to know the process of making dragees.

Dragees are preparations of very soft colours and glossy coatings of sugar and have the following ingredients in their composition:—

(1) Almonds.
(2) Loaf sugar.
(3) Perfumed water, such as distilled rose water or orange flower water.
(4) White gum.
(5) Pure alcohol.

PRINCIPLE OF MANUFACTURE

The operations involved in preparing dregees may be broadly classified as:—

(1) Gumming.
(2) Bulking.
(3) Whitening.
(4) Filling.
(5) Polishing.

Gumming.—The almonds are heated in a pan and after being sifted to remove dust, etc. are put in a pan containing gum which has been previously melted and sifted while hot. Mix well so that all the nuts get a thin coating. Then the nuts are transferred to a drying room till quite dry.

Bulking—Dissolve half of the sugar in half of the orange flower water and heat. This syrup is poured slowly over the nuts in a pan kept warm. Then allow to dry and again add

more sugar. After three coatings of sugar, add melted gum for another coating. Stir the dragees with hand and allow to dry overnight.

Whitening.—For whitening, melt a third of the sugar with a part of orange flower water and proceed as above. In some cases whites of eggs beaten stiff are added to the syrup for filling.

Finishing.—Melt 1/12th part of sugar with water and perfumed water. When the sugar is melted, add some alcohol. Add the syrup a little at a time and dry completely. Keep the dragees warm.

Polishing—For finishing dissolve the rest of sugar in water and alcohol. Add the warm sugar to the warm dragees. Last three coatings should, however, be applied cold. Don't apply gum during the finishing operation. Put in muslin bags and roll often to prevent sticking. In each case the dragees should be warm before syrup is pored in.

ALMOND DRAGEES

Almonds	24	lbs.
Loaf sugar	37	,,
Orange flower water	10	,,
Water	3	,,
White gum	2	,,
Pure alcohol	1½	gills.

Procedure:—As above. Almonds should be only warm and not too hot. Sift and dust with granulated sugar. For bulking use 19 lbs. sugar and 6 lbs. orange flower water (38°Be), for whitening melt 10 lbs. of sugar with 3 lbs. orange flower water (38°Be), for polishing melt 4 lbs. of sugar in 2 lbs. of pure water and then add ½ gill. of pure alcohol (36°Be).

NAIL POLISH

Celluloid in small pieces	50	parts.
Absolute alcohol	100	,,
Amyl acetate	300	,,
Acetone	600	,,
Spirit soluble rhodamine B	0.1	,,

Clean the film and cut into small pieces. Mix the alcohol, acetate and acetone in an enamelled vessel and filter bright. To this add the celluloid pieces and shake frequently until dissolved. Warm a little to get a perfect solution. Now add the colour. The product is of syrupy consistency. Pack airtight.

PAINTING ARTIFICIAL SLATES

2390 I.K., Rajkot—Desires to know the process of making painting artificial slates.

The paint used in painting artificial school slate consisting of 7 parts of linseed oil, 1 part of ground ochre, 3 parts of tar oil and 1 part of asphaltum. The painted articles is then heated to about 200°F and allowed to cool.

ENAMEL PAINTS

10 lbs. of zinc oxide, ground in linseed oil, are mixed very thoroughly with about 1 gallon of pale copal varnish; 1 pint of pale Japan gold size is added and the mixture is then thinned a little by the addition of ½ pint of turpentine oil. It is of the utmost importance to extract every particle of material which could mar the uniformity of the enamelled surface and with that object the mixture is passed through a series of three sieves or strainers, the last being of a very fine mesh. The enamel being somewhat thick, soft revolving brushes are usually employed to facilitate the operation of straining.

Although the above recipe is a practical one, as a matter of fact "stand oil" (which is a thickened linseed oil) often takes the place of the varnish, and excellent enamels are made which do not contain an ounce of gum resin.

TOOTHACHE DROPS

2297 B.M.L.B., Delhi—Wants a formula of toothache drops.

Camphor	2	parts.
Menthol	2	,,
Wood Creosote Oil	2	,,
Clove Oil	1	part.
Alcohol	2	parts.

Mix.

BENZOIN

Benzoin is a balsamic resinous exudation from Styrax Benzoin and other species of the N. O. Styraceae, trees native to Siam, Sumatra and Java. The method of collecting benzoin does not appear to be uniform, as the following two accounts will indicate. According to information received by Rordorf, pieces of bark of rectangular shape are loosened and the resin runs out of the inner side of the bark, solidifying there by the heat of the sun. This forms the finest quality. The smaller fragments are formed into lumps by hand. The resin is spread out on a strong mat in a heap, and ginger roots, first hollowed and filled with the marrow of the bones of the pig, are mixed with it and the mats are tied up at the end in a bundle. The contents are examined from time to time to see if the fat has been taken up and if not fresh fat is added. It is said that rancid pork fat will not, like fresh fat, pass through the ginger root. This process takes about a year, its object being to give a fine aroma. When the fat has disappeared from the ginger, the resin is ready for export, without risk of losing its fine odour through the hot and long journey.

Siam benzoin which is originally white and opaque, assumes a reddish-brown translucent on the surface when exposed to the air.

CORN STARCH

2449 R.J.P., Ahmednagar—Desires to know the process of making corn starch.

The grain first passes through immense fan mills, to remove chaff and dirt, or any substances which might afterwards injure the machinery. Thence it is passed to enormous

[illegible], where it is soaked, so as to render its constituents more easily separated, that the starch may be extracted. After sufficient time the grinding process follows; and for this purpose twenty-four pair of burr stones and six pair of heavy iron rollers are used; these mills work day and night, and operating on wet grain, change it into pulp rather than into flour, the object being to crush and thoroughly disintegrate the particles. This pulp then passes through a great number of screens and drum sieves, which do the first part of the work of separating the starch from the hull, the refuse being used as a food for cattle.

The milky fluid which results from the working is conducted into immense cisterns or vats where it has to receive several washings, during which various solvents and filtered water are used for the removal of all impurities, and the separation of the pure starch from all the other constituents of the grains. After this is done, the starch water, as it may be called, is allowed to run into moulds, where, when it has entirely settled, the deposit will have made a brick-like cake, which may be broken into required cubes having desired weight.

DAHI MAKING

To prepare dahi, milk is heated in an open pan and made to boil briskly. The milk is then stirred with a ladle. The operation is stopped when froth appears on the surface. In the meanwhile a number of earthenware pots, shallow and wide-mouthed, are kept ready. These should be preferably new and when old vessels are to be re-used, the inner side should be cleaned perfectly well and charred by burning a quantity of straw within. The vessels in all cases should be clean. Hot milk is then poured into the pots, which may be of any desired capacity up to 10 seers. Starters are then put in the vessels, which are placed on shelves of a room which should be rather warm. To preserve the heat, the vessels may be wrapped with blankets.

Certain preparations of dahi contain a good proportion of sugar, usually 1 part of sugar being added to 4 parts of milk during boiling.

When the milk is boiled immediately as obtained from the cow and is curdled, it contains all its fat or butter. In this form it is called sara; and if kept hot may be accumulated for some days till sufficient has been collected to form it into dahi. This is therefore called basa-dahi.

If butter be removed from the dahi by churning, the liquid that remains is butter-milk or ghol-dahi (Matha, lassi). But a top layer of the dahi may be simply skimmed off and used in the manufacture of butter. Hence there may be whole-milk dahi (basa-dahi), skimmed milk dahi, as well as butter-milk (ghol-dahi).

AGAR-AGAR

Agar-agar is a gelatinous substance prepared from different species of [illegible], plants belonging to the N.O. Rhodophyceae and also from Eucheuma and Gracilaria. The algas are collected, washed in hot water, strained, pressed and subsequently cut into strips like straws, in which condition they appear in commerce. The principal constituent is a carbohydrate named Gelose. When agar-agar is immersed in cold water it swells, but is soluble on being boiled with water. A half per cent solution gelatinises on cooling.

PREPARATION OF IMPROVED CELLULOID

2463 H.K., Ajmer—Desires to learn a process of preparing celluloid.

This product is obtained by mingling with celluloid under suitable conditions, gelatin or strong glue of gelatin base. It is clear that the replacement of part of the celluloid by the gelatin, of which the cost is much less, lowers materially the cost of the final product. The result is obtained without detriment to the qualities of the objects. These are said to be of superior properties, having more firmness than those of celluloid. And the new material is worked more readily than the celluloid employed alone.

The new product may be prepared in open air or in a closed vessel under pressure. When operated in the air, the gelatin is first immersed cold (in any form, and in a state more or less pure) in alcohol marking about 140°F., with the addition of a certain quantity (for example, 5 to 10 per cent) of crystallizable acetic acid. In a few hours the material has swollen considerably and it is then introduced in alcohol of about 90 per cent, and at the same time the celluloid pulp (camphor and gun cotton), taking care to add a little acetone. The proportion of celluloid in the mixture may be 50 to 75 per cent of the weight of the gelatin, more or less, according to the result desired. After heating the mixture slightly, it is worked, cold, by the rollers ordinarily employed for celluloid and other similar pastes, or by any other suitable methods.

The preparation in a closed vessel does not differ from that which has been described, except for the introduction of the mixture of gelatin, celluloid, alcohol, and acetone, at the moment when the heating is to be accomplished in an autoclave heated with steam, capable of supporting a pressure of 2 to 5 pounds, and furnished with a mechanical agitator. This method of proceeding abridges the operation considerably; the paste comes from the autoclave well mingled, and is then submitted to the action of rollers. There is but little work in distilling the alcohol and acetic acid in the autoclave. These may be recovered, and on account of their evaporation the mass presents the desired consistency when it reaches the rollers. Whichever of the two methods of preparation may be employed, the substance may be rolled as in the ordinary process, if a boiler with agitator is made use of; the mass may be produced in any form.

RECOVERY OF GLYCERINE FROM SPENT LYE

3485 P.S.F., Veraval—Wishes to know a process of recovering glycerine from spent lye.

The following method of extracting glycerine is generally followed by manufacturers: The soap lye, which contains 3 to 8 per cent of glycerol and 8 to 14 per cent of salt, is cooled and a little lime is added to precipitate the fatty acids as lime salts; the precipitate is separated by filtration and the lye is then neutralised with acid, any fatty acids which separate being skimmed off. It is evaporated in a lead-lined vessel until it has a density of 34°Be. A considerable amount of salt separates during evaporation and is removed from the vat when it is emptied. After the removal for the evaporator the crude glycerine is allowed to stand so that any suspended salt may subside. It is then pumped into a large copper still in which it is distilled by means of steam which is superheated to 350°C by passing it through a coil of pipes in the fire-place. Below the retort a vacuum is maintained throughout the plant by means of a pump. The glycerine is condensed in a series of pipes by atmospheric condensation.

The glycerine obtained by the above process is not quite pure since it contains some water and is coloured more or less yellow by traces of organic matter. The water is removed by heating it in a pan with a close steam coil until it reaches a density of 1.26, when it is sufficiently pure to be used for most commercial purposes.

ALUMINIUM OXIDE

2514 S.D., Calcutta—Wants to know the process of preparing aluminium oxide, and also zinc chloride, and stannous chloride.

This oxide occurs in nature in the crystalline form. When pure, the crystals are colourless, and then constitute the mineral termed corundum.

By intense ignition of aluminium sulphate, the water and sulphuric acid are expelled, leaving behind a porous mass of aluminium oxide. It is exceedingly difficult, however, to drive off the last traces of acid. If an organic salt of alumina is more readily obtained, as such acids are decomposed with much greater readiness. Alumina may be prepared in the crystalline form by heating together in a furnace alumina and barium fluoride; a volatile fluoride of aluminium is formed, and this, in suffering decomposition, yields crystalline alumina. If a small quantity of potassium bichromate be added to the mixture, the crystals have a rose-red colour, and are identical in appearance, constitution, and characters with the natural ruby.

ZINC CHLORIDE

Zinc chloride is chiefly used as a preservative in the preparation of office paste. It is also used in pharmacy as a caustic and disinfectant. It is also employed on the large scale in weighting cotton goods. It is also used as a chemical reagent in separating silk fibres from those of wool, cotton or linen. In order to prepare this important compound of zinc put 16 oz. of granulated zinc into a porcelain basin, add by degrees 44 fl. oz. of hydrochloric acid previously mixed with 1 pint of distilled water, and aid the reaction by gently warming it on a sand-bath until gas is no longer evolved. Boil for half an hour, supplying the water lost by evaporation, and allow it to stand on the cool part of the sand-bath for 24 hours, stirring frequently. Filter the product into a gallon bottle, and pour into a solution of chlorine, in sufficient quantity by degrees, with frequent agitation, until the fluid acquires a permanent odour of chlorine. Add ½ oz. or a sufficient quantity of carbonate of zinc, in small quantities at a time, and with renewed agitation, until a brown sediment appears. Filter through paper into a porcelain basin and evaporate until a portion of the liquid withdrawn on the end of a glass rod and cooled, forms an opaque white solid. Pour it out now into proper moulds, and when the salt has solidified, but before it has cooled, place it in closely stoppered bottles.

STANNOUS CHLORIDE

This salt may be prepared by heating tin in a current of hydrochloric acid gas; it fuses at 250°C and boils at 606°C. The vapour at low temperatures has a density less than is required by the formula, $Sn_2 Cl_4$, but at a greater heat agrees closely with $Sn Cl_2$. In the wet way, stannous chloride is formed by dissolving granulated tin in concentrated hydrochloric acid, with the air of a gentle application of heat. The operation is usually conducted in copper vessels, as the two metals in contact induce voltaic currents which result in the more rapid solution of the tin. The liquid on being concentrated deposits crystals containing two molecules of water. Stannous chloride is soluble in a small amount of water, but on the addition of a greater quantity is thrown down as a precipitate of Stannous oxychloride, $Sn Cl_2 SnO 2H_2O$. Owing to the great readiness with which stannous chloride combines both with chlorine and oxygen, it is a powerful reducing agent. It is used in both dyeing and calico-printing as a mordant, being known under the name of tin-salts.

MARKING INK

2552 S., Lucknow—wants to have a recipe of marking ink.

Aniline oil	85	parts.
Potasium chlorate	5	„
Distilled water	45	„
Hydrochloric acid (Sp. Sr. 1.124)	68	„
Copper chloride	6	„

Mix the aniline oil, $KCl O_3$ and 26 parts of the water and heat in a capacious vessel, on the water bath, at a temperature of 175° to 195°F until the chlorate is entirely dissolved. then add one-half of the Hcl and continue the heat until the mixture begins to take a darker colour.

Dissolve the copper chloride in the residue of the water, add the remaining HCl to the solution, and add the whole of the liquid on the water bath; and heat the mixture until it acquires a fine red-violet colour. Pour into flask corked tightly and set-aside for a few days, or until it ceases to throw down a precipitate. When this is the cases, pour off the clear liquid into smaller containers for use.

—READER'S BUSINESS PROBLEMS

[Reader's business problems will be discussed in these pages. We invite the reader to write us his difficulties. As the department is in charge of an experienced businessman who is specially adept in dealing with such problems and to whom experiences of a large number of successful businessmen are available, his replies will lead the enquirer to a successful career. These replies will be published in the paper only and cannot be communicated by post.]

CREATING CUSTOMERS BY ADVERTISEMENT

1942 R.L.G., Jubbulpore—Will you please explain the efficacy of good advertisement in creating new customers?

In consequence of the complexity of the industrial situation brought in by the development of civilised and economic surroundings in which we are living and moving there has grown up a feeling of competition which has evolved the modern art of advertising. Advertising is gradually, and withal specially growing into a professional art; when well done it is indeed the quickest and cheapest means to attract new customers. Every one in business is now feeling the value and necessity of advertising—the manufacturers creates a demand for his products through advertising, the agent persuades the dealer to carry a good stock, the dealer educates the people into new needs, all through diverse methods of advertisement. Every manufacturer, every trader, every dealer avails himself of every opportunity by advertising propaganda of varying methods to place the public mind in a receptive condition regarding his commodities. It is indeed experience of many that nothing pays better than right advertising at the right time in the right medium. No firm whether manufacturer or seller can now-a-days ignore the power of advertising even if it is merely for dissemination of information of his goods. Public must be taught the good points even of good articles, otherwise it is slow to appreciate.

HOW TO INCREASE SALE

2592 M.L.S., Lahore—I am a manufacturer. I am selling my articles to 120 wholesalers, I have about 10 wholesalers in every important town. They are not pushing my articles but cutting prices. How can my sale increase?

We think our manufacturer has enough of wholesalers. You must first of all stop this. Because when there are lots of wholesalers of the same article naturally will they try to compete. But what (competition) is play to them is death to the manufacturer. To solve this problem you should sell your goods to ten or twelve wholesalers only. You may allow only one or two to sell wholesale in the same town. This will naturally keep alive a healthy interest and will undoubtedly give a chance to greatly increase your sale.

These ten or twelve wholesalers cannot but stop carrying competing lines. They must have to help the retailers to sell and the retailers shall have to maintain prices. As a result of this both the wholesalers and manufacturers will be happy.

PROSPECTS OF A DAIRY FARM

2597 G. N. M., Bombay,—Enquires if the business of dairy farming is profitable.

Yes, cow-keeping, if carried out properly can be made paying and profitable. The daily cost of feeding and keeping a cow should not ordinarily exceed three-fourths the price of the milk she gives. If a cow gives 6 seers of milk per day, and the price of milk be 8 annas a seer, her food and keep should not ordinarily cost more than Re. 1-8 per day. It is profitable to keep large cows yielding much more milk for business purpose. A large cow properly fed and giving 12 seers of milk should never cost more than Rs. 3 a day for her food and keep. But you get Rs. 6 per day selling the milk two seers per rupee. Thus you get 100 p.c. profit.

Besides the profit from the milk, there is the calf. If the calf be of a good breed, and proportionately developed at ten months of age it will sell for from thirty to forty rupees. Then again there is the dung. Some people make a great deal of profit from this article. The dung should be gathered every day, and preserved for either manure or fuel. It should be made into cakes or rolls, and dried and sold as fuel, or else a pit should be dug, and the rung and urine collected into it every day. Cow dung and urine make splendid manure. The dung of one cow should fetch from two rupees to three rupees a month. There is money even in the hide, horns, and bones of the cow when she dies.

A cow purchasd is, if well managed, so much capital; a calf born is so much increase on your capital, and the cost of the mother's feed and keep is more than balanced by the milk and butter she supplies.

To ensure success in dairy farming it is of the utmost importance that the best milking breeds be selected. Some people are penny wise and pound foolish, and will buy cows of no stable breed whatever and of very inferior milking qualities, rather than pay a decent price for a good and pedigreed one. An ordinary cow can be bought for a few rupees, but she will give little or no milk, and her feed and keep will cost more than her milk is worth. Besides, her calf will sell for hardly anything. This is a great loss in business. It is always more profitable to keep a good cow that will give the required amount of milk than to keep three or four inferior ones that will in the aggregate give that quantity. Four inferior cows will cost more to feed and keep than one or two good ones will.

—BRIEF QUERIES AND REPLIES

Questions of any kind within the scope of Industry are invited. Enquiries or replies from our experts will be published free of charge in serial order. Questions are replied by post on receipt of As. 8 stamps for each question. Subscribers outside India are requested to send two international Reply coupons for each question. In order to facilitate the work of Editor's Department and to help prompt action the readers are requested to send enquiries in separate letters.

2666 H.R., Agra—Tannic acid, gallic acid and dyes may be had of Fuzlehussein & Bros., 44, Armenian Street and Champalal Agarwala, 45, Armenian Street; both of Calcutta.

2667 R.N.M., Ganjam—Process of manufacturing superphosphate will appear in due course.

2678 P.S.S., Jagraon—For cement working machine enquire of Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta and Martin & Co., 12, Mission Row, Calcutta.

2679 D.T.D., Patna—Following is a formula of artificial vinegar: Molasses 1 gallon; acetic acid 4 lbs. Put the ingredients together into a cask of about 40 gallon capacity. Fill it with distilled water; shake it up and let it stand from one to three weeks. Strain and bottle for use.

2680 K.H.T., Daltonganj—Soapstone and sodium silicate may be had of Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane, Calcutta.

2681 R.P., Sambalpur—For perfumes and flavours enquire of Paradise Perfumery House, 7, Colootola Street; F. N. Sarkar, 33, Canning Street; Ghose Bros., 50, Ezra Street and Sikri & Sons Ltd., 55-8, Canning Street; all of Calcutta.

2682 A.C., Jamnagar — For training in rubber stamp making enquire of B. Goray & Co., 156, Cornwallis Street, Calcutta.

2684 S.K.R.K.R., Moradabad—Following is a formula of lustre polish: Tallow 1 lb.; red oxide 2½ oz.; rottonstone 2 oz. Mix the oxide and rotton stone. Then melt the tallow and incorporate the other materials. Remove from heat but continue stirring for a few minutes more. Then pour into moulds.

2685 S.P.P., Basti—For brick making machine enquire of Martin & Co., 12, Mission Row, Calcutta.

2686 M.C.S., Mirzapur—For a book on hypnotism enquire of Latent Light Culture, Tinnevelly.

2687 J.T.L., Rhenock—You may use potassium metabisulphite for preserving orange juice.

2688 S.D.M., Indore—A formula of boot polish appeared in November, 1949, issue of Industry. Raw materials may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta and Banshidhar Dutt, 126, Khengrapatty, Calcutta. Printed tin cans may be had of Bengal Tin Box Mfg. Co. Ltd., 1, Jadu Nath Mitter Lane and National Sheet & Metal Works Ltd., 26A, Sahitya Parishad Street; both of Calcutta.

2696 H.R., Agra—For plastic sheet and dies enquire of Francis Klein & Co., Ltd., 1, Royal Exchange Place, Calcutta.

2697 O.P., Delhi—Process of manufacturing matches will be found in Safety Matches and Their Manufacture by K. C. Das Gupta published from this office, price Rs. 5/8/- including postage.

2698 A.B.V.C.S., Golaghat — For dairy machine you may enquire of Edward Keventers Ltd., 11/3, Lindsay Street, Calcutta.

2699 R.H.L., Delhi—For pyrometer enquire of Adair Dutt & Co. Ltd., Stephen House, 4, Dalhousie Square, Calcutta.

2700 H.S.M.C., Gulbarga—Plastic machine and dies may be had of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta. Plastic powder may be had of Imperial Chemical Industries (India) Ltd., 18, Strand Road, Calcutta. For retreading machine enquire of Volkart Bros., 8, Netaji Subhas Road, and W. Evans & Co. Ltd., Stephen House, Dalhousie Square; both of Calcutta.

2701 S.M.P., Papadwanj—For soda water machines enquire of Tulion Traders, 732, Shariffpura, Amritsar.

2702 B.P.W., Patiala—You may try the following formula of the compound:—Benzyl acetate 350 parts; benzyle formate 30 parts; linalol 150 parts; benzyl alcohol 100 parts; methyl anthranilate 50 parts; hydroxycitronellol 150 parts; ylang ylang oil 30 parts; amyl cinnamic aldehyde 50 parts; neroli oil 10 parts; aldehyde C 10 p.c. 10 parts; jasmin absolute 70 parts.

2703 E.R.S., Moradabad—Collapsible tubes may be had of Metal Box Co. of India Ltd., B2, Hide Road, Kidderpur, Calcutta.

2704 P.M.S., Agra—Reply to your query appears in January 1951 issue under No. 2589. You may have a copy of the above issue sending -/8/- annas postage stamp.

2712 R.P.J.L., Dodhpur—Following is a list of hinge manufacturers: Abdul Kader Shamsuddin & Co., 41, Khoka Bazar, Bombay 3; Golden Engineering Works, Bulandshahr; M. L. Chatterjee & Sons, 4, Commercial Bldgs.,

Calcutta and P. B. Shah & Co., Ltd., 29, Netaji Subhas Road, Calcutta.

2713 R.S.G., Raiganj—Process of manufacturing sindur and papper will be found in Home Industries published from this office, price Rs. 3/7/- including postage.

2714 H.P.B.D., Saurastra—Following is a formula of slate pencil: Powdered slate 60 parts; powdered limestone 30 parts; sodium silicate 10 parts. Knead together all the ingredients to form a plastic mass and then force it through metallic tubes of suitable diameter fitted with piston. Afterwards cut off into usual lengths and bake over a slow fire.

2715 D.D.P., Farrukhabad — For spray drying machine enquire of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta.

2716 M.D.C.C., Calcutta — For printing transfer stamp write to signograph Co., Baranagore, Calcutta and R. G. Pal & Co., 110/2, Grey Street, Calcutta.

2717 T.K.S.C., Salem—For selling groundnuts advertise in Classified Bargain pages of Industry. Your enquiry cannot be published in Trade Enquiry columns.

2718 C.B., Kakinada—Process of manufacturing phenyle appeared in April 1950 issue of Industry.

2719 U.C.C., Kanpur—You may have your name registered with Advertising Agencies Association of India, Sandhurst Road, Bombay.

2720 A.K.S., Amritsar—To make table salt dissolve lump rock salt in four times its weight of water, filter and then drop into the filtered solution first chloride of barium and afterwards carbonate of soda as long as any precipitate falls. Then filter and evaporate the clear fluid very slowly until crystals begin to appear. When this condition has been reached set aside the solution for a day. The crystals are taken out, dried and kept in bottles.

2729 G.J. Faizabad — You may consult Manufacture of Ink published from this office, price Rs. 3/7/- including postage. Corks and bottles may be had of Radha Bazar Bottle Stores, 15, Radhabazar Lane, Calcutta. Raw materials may be had of Fuzlehussein & Bros., 44, Armenian Street and Champalal Agarwala, 45, Armenian Street; both of Calcutta.

2730 E.P.P., Aurangabad—Following is a formula of tooth powder: Precipitated chalk 10 oz.; magnesium peroxide 3 oz.; soap powdered 1 oz.; oil of wintergreen 1 oz.; oil of rose ½ oz.; menthol ½ oz.

2731 K.M., Talikulam—A formula of tooth paste appeared in November, 1949, issue of Industry.

2737 I.B.S., Nellore—Process of manufacturing micanite will appear in due course.

2738 B.A.S.R., Colombo—Arecanut desiccator may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

2739 S.B.C., Banda—Wool weaving machine may be had of W. H. Brady & Co. Ltd., Mercantile Bldg., Lall Bazar, Calcutta. Process of wool carding will appear in due course.

2740 C.L.U., Patiala—We are not aware of any journal dealing with biochemistry. There is no biochemic institute giving training by correspondence course.

2741 P.G.B.L., Shillong—We have no book on glass manufcture. You may however enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta.

2742 S.S., Moradabad—Following is a list of dairies: Express Dairy Co. Ltd., 198, Bhupen Roy Road, Behala; Lake Dairy, 1, Parasar Road and S. K. J. Limited, 3, Madan Street; all of Calcutta.

2745 R.C.D., Panihati — Collapsible tubes may be had of Metal Box Co. of India Ltd., B-2, Hide Road, Kidderpur, Calcutta.

2746 K.D., Jalpaiguri—It is not possible to start glass manufacture with Rs. 5000/-. We have no book dealing with glass manufacture. For a book on glass manufacture enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta.

2747 P.S.P., Coimbatore — Nickel plated articles are subjected to a process of scratch brushing that is long continued friction with wire brushes under water, which not only removes any adhering oxide, but renders the surface bright.

2748 P.A.J., Travancore—For calendars and date pads write to Empire Calendar Mfg. Co., Post Box No. 6734 and Oriental Calendar Mfg. Co., Moti Jheel, Dum Dum, W. Bengal.

2749 I.B.G., Agra — We have no book on silk weaving bleaching and dyeing. You better enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta.

2750 P.C.S., New Delhi—Process of making tea tablets appeared in November, 1949, issue of Industry.

2751 A.R.M., Kumbakonam — Process of manufacturing copper, ammonium chloride, etc. will appear in due course.

2752 J.W.E., Muzaffarnagar — For transformer strips write to Phillips Electrical Co. (India), Ltd., 2, Heysham Road, Calcutta.

2753 B.V.P., Ranchi—An article on printing roller manufacture appeared in April, 1950, issue of Industry. We have no book on the above subject.

2754 N.R.D., Bombay—You may consult Practical Latex Works and Latex Moulding by Plaster Casting. Both the books may be had of The British Industrial Institute, Rampur, U. P.

2755 C.B.P.S., Gorakhpur—Plastic machine and other machines you require may be had of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension and Francis Klein & Co., Ltd., 1, Royal Exchange Place; both of Calcutta.

2756 K.C., Udhampur—Dairy appliances may be had of Edward Keventers Ltd., 11-3, Lindsay Street, Calcutta.

2757 T.S.P.R., Eluru—You may take up manufacture of thymol and menthol crystals, eucalyptus oil, camphor, etc. You do not require any licence.

2758 S.R., Bangalore—Process of manufacturing calcium carbide will be found in Chemical Industries of India published from this office, price Rs. 3-7 including postage.

2759 S.R.B.R., Simla—An article on office paste and liquid gum manufacture appeared in April 1950 issue of Industry.

2760 C.P., Mathura—Reply appears in December issue under No. 2597.

2761 H.C.B., Dehra Dun—Process of making grinding wheel appears in this issue.

2762 C.A.R., Vizagapatam—An article on bone industry appeared in November 1950 issue of Industry.

2775 J.S.G.I., Delhi—For cycle lamps enquire of India Cycle Manufacturing Co., Ltd., 9, Tiljala Road, Calcutta; Jai Hind Cycle Works, Old Gurgaon Road, Paherganj, Delhi and Hindusthan Bicycle Manufacturing & Industrial Corporation Ltd., Phulwari Sharif, Patna.

2776 H.C.S., Allahabad—You should advertise widely for popularising your name.

2778 M.K.C., Tiruchirapalli—To manufacture plaster of Paris grind gypsum to powder in a disintegrator. Then pass through a 100-120 mesh screen. Next calcine the powder in an iron vessel with continued stirring at temperature of about 120°C. Finally pack the plaster of paris in air tight barrels either of tin or wood.

2780 M.L.T., Farrukhabad—Following is a list of enamel works:—Bengal Enamel Works Ltd., 15, Old China Bazar Street. Calcutta; Bombay Enamel Works Ltd., 104, Sion-Matunga Estate, Sion, Bombay 22 and Sur Enamel & Stamping Works Ltd., 9, Middle Road, Entally, Calcutta.

2781 R.R., Kumbakonam—An article on wax pencil manufacture appears elsewhere in this issue.

2782 H.R.B., Kanya—Bhutnath oil is manufactured by B. K. Saha, 3 & 4, Butto Kristo Paul Avenue, Calcutta. Lime oil may be had of Butto Kristo Paul & Co., Ltd., 1 & 3, Bonfield Lane, Calcutta.

2783 H.Y.S.B., Koppa-Kadur—We are not aware of any such stone. Hurricane lanterns are manufactured by A. K. Sarkar & Co., Barrackpur Trunk Rd., Barnagore; Eastern Hurricane Mfg. Co., Ltd., 1, British Indian St., Calcutta; Jay Engineering Works Ltd., 183A, Prince Anwar Shah Road, Dhakuria, Calcutta; Ogale Glass Works Ltd., Ogalevadi, Satara and Oriental Metal Industries Ltd., 34, Chittaranjan Avenue, Calcutta. You should not use sulphur dioxide gas for refining cane juice to produce jaggery. To prepare DDT solution take DDT 10 parts and put it in carbontetrachloride 90 parts. Shake for a few minutes and then keep aside for a few days. Address of Calcutta Market is 2, Ramlochan Mullick Street, Calcutta.

2784 K.V., Vellore—Formulas of tea, coffee, ghee and butter flavours will appear in due course.

2785 R.M., Thana—An article on firework manufacture appeared in October 1950 issue of Industry.

2786 D.K.K., Nivli—Following is a list of tanneries: Karnatak Tannery, Gadag; Oriental Tanneries, 262, Choti Galli, Sholapur; Ah Woon Tannery, 37, South Tangra Road, Tiljala, Calcutta; Chan Tai Tannery, 47, South Tangra Road, Calcutta; T. S. Tannery, 82, South Tangra Road, Calcutta; Easton Tanneries Ltd., Kanpur; Hindusthan Tanneries Ltd., Jajmali Road, Kanpur; A Kong Tannery, 47-6, South Tangra Road, Calcutta and M. A. Jamil & Bros., Bezwada. An exhaustive list will be found in Industry Year Book and Directory published from this office.

2796 K.B.S., Mirzapur—There is no arrangement for giving practical training on plastic industry. It is not possible to manufacture plastic from potatoes.

2797 K.M., Talikulam—Chemicals you require may be had of Butto Kristo Paul & Co., Ltd., 1 & 3, Bonfield Lane, Calcutta. Woolfat has a soothing effect on skin.

2798 A.R.K., Kanpur—Medical and scientific instruments may be had of Medico Scientific Stores, 30, Colootola Street; Scientific Instrument Co., Ltd., 11, Esplanade East and India Scientific Stores, 14-2, Old China Bazar Street; all of Calcutta.

2799 A.Z., Pratavgarh—We have no book on silk dyeing and printing. You may however enquire of Thacker Spink & Co. (1933), Ltd., 3, Esplanade East, Calcutta.

2800 G.C.M., Delhi—Process of making collodion, etching powder, etc. will appear in due course.

2801 T.D.B., Fyzabad—Following is a list of bristle dealers: Indian Bristle & Lard Supply Co., 31-1, Tangra Road, Calcutta; Khaitan Sons & Co., 2, Dalhousie Square East, Calcutta;

Koulhar Trading Corporation, Kamptee, Nagpur; Volkart Bros., Armenian Street, Madras; Andhra Bristles Dealing Company, Bhimavaram; Aspinwall & Co., Ltd., Cochin; H. & S. Bros., 105, Kalvi Road, Kanpur; Hind Bristle Co., Mulberg House, Agra and Narayan & Sons, Patkapur, Kanpur.

2802 A.K.C., Calcutta—Chalk crayon mould may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta and Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta. You may start the business with Rs. 2,000.

2803 N.S., Salem—Starch making machines may be had of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension and Francis Klein & Co., Ltd., 1, Royal Exchange Place; both of Calcutta.

2804 R.L.S., Delhi—For hooks and rings enquire of the following firms: A. T. Alihusain & Co., 29, Strand Road; A. T. Coomar, 77, Netaji Subhas Road; B. Sinha & Co., 38, Chandney Chowk Street and Bose, Bose & Co., 184, Chandney Chowk; all of Calcutta.

2816 S.K.S., Sagar—Reply of query letters is published in these columns. But when a reply by post is required 8 annas are charged for each question. For red oxide enquire of Calcutta Mineral Supply Co., Ltd., 31, Jackson Lane, Calcutta. You may try Butto Kristo Paul & Company, Limited, 1 & 3, Bonfield Lane, Calcutta. Price of Industry Year Book and Directory is Rs. 16-4 including postage. We have no such book.

2817 G.V.B., Jamnagar—You may communicate with the following mineral dealers: Calcutta Mineral Supply Co., Ltd., 31, Jackson Lane; Indian Minerals & Associated Industries, 12, Netaji Subhas Road; Indian Mineral Industries Ltd., 22-1, Dum Dum Road and Swaika Mineral Crushing Mills & Industries Ltd., 28A, Pollock Street; all of Calcutta. You may start soap manufacture with Rs. 4,000 to Rs. 5,000.

2818 R.N.S., Laidas—For tubewell sinking write to Standard Tubewell & Engineering Works Ltd., P-13, Ganesh Chandra Avenue; Scientific Well Co., 14, Raja Woodmunt Street; Expert Tube Well Co., 139-1, Bowbazar Street and Bharat Tubewell Co., 118-A, Chittaranjan Avenue South; all of Calcutta. For pumps enquire of the following firms: Ebrahimji Rassanbhoy & Sons, 30, Strand Road; Harland Engineering Co., Ltd., 12, Mission Row and Darling Pump Manufacturing Co., 58, Netaji Subhas Road; all of Calcutta.

2820 P.G.A., Bombay—Process of manufacturing phenyle will be found in Manufacture of Disinfectants and Antiseptics published from this office, price Rs. 3-7 including postage. An article on liquid disinfectant manufacture appeared in April 1950 issue of Industry. We have no book on varnish manufacture.

2821 D.C., Bombay—Following is a formula of artificial vaseline: Hard paraffin 20 parts; white mineral oil 80 parts. Melt the paraffin over slow fire and mix the mineral oil. Remove from fire and continue stirring until cool.

2823 R.P.S., Banaras—Wool fat and stearin may be had of Butto Kristo Paul & Co., Ltd., 1 & 3, Bonfield Lane and Calcutta Chemical Co., Ltd., 10, Bonfield Lane; both of Calcutta.

2824 J.R.K., Ludhiana—An article on transfer paper manufacture appeared in July 1950 issue of Industry.

2825 S.N., Pakyong—For bleached wax enquire of Calcutta Chemical Co., Ltd., 10, Bonfield Lane, Calcutta. For juniper berries enquire of Banshidhar Dutt, 126, Khengrapatty Street, Barrabazar, Calcutta and Indian Herb Store, 31, Mullick Street, Calcutta. Process of bleaching beeswax will appear in due course.

2833 G.G.P., Belgaum—It is not possible to manufacture paper out of hay and paddy grass. It is not possible to make iron and steel on very small scale.

2834 T.S.L., Cachar—We do not deal in any article, we only supply information to our readers. For supplying fruits you may negotiate with the following firms: Delawar Jan Md. Ariff, 12, Ram Lochan Mullick Street; Fakir Mohamed, Uzir Mohammad, 12, Ram Lochan Mullick Street; all of Calcutta. For terms of business you should write the firms direct.

2835 D.P., Daltonganj—Soapstone, talcum powder and sodium silicate may be had of Calcutta Mineral Supply Co., Ltd., 31, Jackson Lane, Calcutta. Soap perfumes may be had of Paradise Perfumery House, 7, Colootola Street and F. N. Sircar, 37, Canning Street; both of Calcutta. Tin cans may be had of Bengal Tin Box Mfg. Co., Ltd., 1, Jadu Nath Mitter Lane, Calcutta.

2836 M.C.J., Kishangarh—We cannot comply to your request. You should advertise your scheme widely so that interested party may take up the scheme.

2837 A.V.S., Kumbakonam—For vermicelli making machine of required type enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

2838 U.S., Anakapalli—Dry cells contain the same composition whether small or large. It is not possible to remove smell of denatured spirit. It is not possible to manufacture toilet soap without caustic soda or caustic potash. Process of manufacturing developing solution will appear in due course.

2839 M.V.B., Bombay—A formula of film cement will appear in due course.

2840 K.V.C., Coimbatore—For artificial silk enquire of the following firms: Gordhandas Ishwardas, 93, Thambu Kanta, Pydhownie, Bombay; Hazarat & Co., People's Bldgs., Sir P. Mehta Road, Fort, Bombay; Chhotabhai Javerbhai & Co., 468, Mint Street, Madras; Sankal Chand G. Shah & Co., 72, Mint Street, P. T., Madras and Calcutta Silk Weaving Co., 47, Murari Pukur Road, Calcutta.

2841 S.B., Srinagar—An article on boot polish manufacture appeared in April 1950 issue of Industry.

2842 T.K.R., Nellore—You should heat the bones under high pressure steam. We have no book dealing with sterilising bone.

2843 D.K., Fyzabad—We have no such book on colour and its uses. You may however enquire of Thacker Spink & Co. (1933), Ltd., 3, Esplanade East, Calcutta.

2844 S.K.S., Puri—Following is a process of making bindi: Gum arabic 10 oz.; carmine 15 oz.; rose water 16 oz.; distilled water 1 quart. Macerate the first two ingredients in a stone mortar with sufficient rose water to make a thin paste. Then put up in phials for use. Menth piperita may be had of Indian Herb Store, 31, Mullick Street, Calcutta and Banshidhar Dutt, 126, Khengrapatty Street, Calcutta.

2845 S.B.L.J., Lucknow—Following is a formula of hair curling solution: Ammonium carbonate 4 dr.; strong solution of ammonia 2 dr.; mucilage of acacia 43 gr.; alcohol (70 p.c.) 2 fl. oz.; rose water sufficient to produce 20 fl. oz. Mix, moisten the hair thoroughly with a little of the liquid and adjust lightly, it will curl as it dries. The best results are obtained if the hair be first washed with a little soft soap and water containing a few drops of solution of ammonia.

2846, B.D.R., Calcutta—Following is a formula of green gold: Gold 75 parts; silver 1606 parts; cadmium 8.4 parts. Melt over and mix thoroughly.

2847 N.J.V., Murtizapur—For brooms enquire of Bonner & Co., 7A, Sukeas Street and Calcutta Brush Works, 16-C, Amherst Street; both of Calcutta. Rope may be had of Hindusthan Rope Co., 135, Canning Street, Calcutta and Surajbhan Radha Kishan, Bharatpur Gate, Mathura. Nibs may be had of F. N. Goopta & Co., 12, Beliaghata Road, and G. C. Law & Co., 2, Cornwallis Street; both of Calcutta. The above firms manufacture also pencil. Foreign made pencils may be had of Nilmoney Halder & Co., 11, Chittaranjan Avenue and Pen & Pencil Agency, 77, Harrison Road; both of Calcutta. A formula of washable distemper appeared in March 1950 issue of Industry.

2855 K.R.G., Tinnevelly—Present whereabout of Chhatbar Trading is not known.

2856 B.G.I., Bettiah—Following is a list of timber merchants: Asiatic Timber Agency, 67-17, Strand Bank Road, Nimtolla; Dutta & Co., 187, Maharshi Debendra Road and Ganges Timber Trading Co., 67-23, Strand Road; all of Calcutta. See under No. 2199 in December 1950 issue of Industry.

2857 S.E.W., Raipur—It is very difficult to suggest names of purchasers of iron scraps. You should advertise in newspapers for selling iron scraps.

2858 G.L.S., Srinagar—For tin cans and tin printing enquire of the following firms: Bengal Tin Box Mfg. Co., Ltd., 1, Jadu Nath Mitter Lane; National Sheet & Metal Works Ltd., 36A, Sahitya Parishad Street and Indian Colour Printing & Hollow Wares Ltd., 243, Upper Circular Road; all of Calcutta.

2859 S.B., Srinagar—Carnauba wax may be had of Calcutta Chemical Co., Ltd., 10, Bonfield Lane, and Banshidhar Dutt, 126, Khengrapatty Street; both of Calcutta.

2860 G.V.G.R., Masulipatam—You may refer your query to Dr. Bose's Laboratory Ltd., 45, Amherst Street, Calcutta.

2861 J.L.S., Dehra Dun—For baby carriage and tricycle making machines enquire of Alfred Herbert (India), Ltd., 13-3, Strand Road and Francis Klein & Co., Ltd., 1, Royal Exchange Place; both of Calcutta. You have to invest at least Rs. 50,000 for the above business.

2865 A.O.B., Nigeria—We do not deal in any article, we only supply information on industrial, technical and commercial line. You should advertise for selling West African produce.

2866 K.A., Seoni—For waxes enquire of Ahura Chemical Products, 84, Sion Road, Sion, Bombay 22; Industrial General Products Ltd., 381, Hornby Road, Ismail Bldg., Fort, Bombay 1 and Kirtikumar & Co., 80, Bhandari Street, Mandvi, Bombay 3. Tin cans may be had of Abdul Sattar Nurmohammed Dabawala, 63, Dontad Street, Mandvi, Bombay; Esoofaly Dawoodbhai, 18, Doctor Street, Bombay and Fidaaly & Co., 7, Falkland Road, 3rd Cross Lane, Khetwadi Back Road, Bombay.

2867 A.R., Bellary—For flavours and essences enquire of Essence and Bottle Supply Agency, 14, Radha Bazar Street and Paradise Perfumery House, 7, Colootola Street; both of Calcutta.

2868 B.K., Bahraich—You may consult Leather and Leather Goods published from this office, price Re. 1-15 including postage. For machine you may enquire of Edison Power Plant Co., Ltd., 34, Ezra Street, Calcutta, and Martin & Burn Ltd., 12, Mission Row, Calcutta.

2869 R., Agra—Reply to your query will appear in Reader's Business Problems Columns.

2870 B.S.M., Aligarh — Horns and hoofs may be utilised in making glue. For crushing bones you should use bone crushing machines which may be had of Marshall Sons & Co. Ltd., 99, Netaji Subhas Road, Calcutta.

2871 N.R.R., Nellore—Process of manufacturing condensed milk and milk powder will be found in Milk and Milk Products published from this office, price Rs. 3/7/- including postage.

2872 M.A., Allahabad — You may consult Philatelic Journal of Great Britain published by Whitfield Kind & Co., Ipswich, England and Philatelic Trader published by Harris Publication Ltd., 112, Strand, London W.C. 2.

2873 S.M.S.A., Sattur—Process of iridium pointing will appear in due course.

2880 J.M.C., Saharanpur—For aluminium sheets, Circles and ingots enquire of Aluminium Corporation of India Ltd., 9, Netaji Subhas Rd., Calcutta; Aluminium Production Co. of India Ltd., 5, Council House Street, Calcutta and Crown Aluminium Works, Parel, Bombay.

2881 O.P.S., Delhi—You should make block from the picture. Then print as many copies of pictures as you like with the help of a printing press.

2882 I.B.S., nellore — For supplying mica in blocks or films write to F. & C. Osler (India) Ltd., 12, Old Court House Street, Calcutta; Calcutta Electrical Manufacturing Co. Ltd., 100, Netaji Subhas Road, Calcutta and Omega Fan Manufacturing Co., 22, Strand Road, Calcutta.

2883 N.I.V., Murtizapur—Address of Burgoyne Burbridges & Co. Ltd., is Manhar Bldg., Hornby Road, Bombay. Process of making hair oil will be found in April 1950 issue of Industry. Process of making cement for plastic will appear in due course.

2894 G.C., Banaras—We are not aware of any motor car driven by electric without using petrol.

2895 R.S.B.L., Mandi Dabwali—For brick making machine enquire of Martin Burn Ltd., 12, Mission Row, Calcutta.

2896 S.N.B.F., Amritsar — Brush making machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta and Francis Klein & Co., Ltd., 1, Royal Exchange Place, Calcutta.

2900 D.S.K., Udaipur—For penholder and toy making machine you require lathe and other machines which may be had of T. E. Thomson & Co., Ltd., 9, Esplanade East, Calcutta.

2901 L.P.G., Delhi—For ball mill enquire of Martin Burn Ltd., 12, Mission Row, Calcutta.

2903 P.M.W., Bhagalpur — Sulphuric acid may be had of Bengal Chemical & Pharmaceutical Works Ltd., 164, Maniktala Main Road, Calcutta. Lead may be had of Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta. These are the two main ingredients required for storage battery manufacture.

2904 B.N.L., Bhagalpur—Chhana is made from whole milk by curdling it with juice of lemons or citric acid. It is obtainable in white, soft, pulpy mass.

2905 L.R.R., Chengail — The red paint generally applied on the back of the mirror is a mixture of red lead and spirit varnish or red lead and good boiled linseed oil of suitable consistency.

2906 M.L.S., New Delhi—For sugar making machines enquire of Martin Burn Ltd., 12, Mission Row; Greaves Cotton & Co. Ltd., 4, Mission Row Extension; Jessop & Co. Ltd., 93 Netaji Subhas Road and Marshall Sons & Co. Ltd., 99, Netaji Subhas Road; all of Calcutta.

2907 S.R.H., Delhi — You perhaps mean hydrosulphite used for refining sugar. For hydrosulphite enquire of Imperial Chemical Industries (India) Ltd., 18, Strand Road, Calcutta.

2908 P.N.V., Delhi—Formulas of fountain pen ink will be found in April 1950, issue of Industry. Process of manufacturing carbon paper and typewriter ribbon will appear in due course.

2909 M.M., Nowgong—Sheet metal working machines may be had of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta and Marshall Sons & Co. Ltd., 99, Netaji Subhas Road, Calcutta.

2910 C.S.C., Coimbatore — Watch accessories and tools may be had of Hamilton & Co. Ltd., 8, Old Court House Street; J. Boseck & Co. Ltd., 16-5, Chowringhee Road and Anglo-Swiss Watch Co., 6-7, Dalhousie Square; all of Calcutta.

2919 D.B.N., Kathmandu—For sugar making plant you may enquire of Martin Burn Ltd., 12, Mission Row; Greaves Cotton & Co. Ltd., 4, Mission Row Extension; Jesson & Co., Ltd., 93, Netaji Subhas Road and Marshall Sons & Co. Ltd., 99, Netaji Subhas Road; all of Calcutta.

2920 H.R.K., Ludhiana—For transfer labels enquire of Signograph Co., Barnagore, Calcutta and R. G. Paul & Co., 110/2, Grey Street; both of Calcutta.

2921 A.C., Ambala City—You may take up plastic industry with Rs. 5,000/-. Machines may be had of Francis Klein & Co. Ltd., 1, Royal Exchange Place; Alfred Herbert (India) Ltd., 13-3, Strand Road and Small Machineries Mfg. Co., 22, R. G. Kar Road; all of Calcutta. You may also consult Plastic Industry published from this office, price Re. 1-7 including postage. Plastic powder may be had of Imperial Chemical Industries (India) Ltd., 18, Strand Road, Calcutta.

2934 K.G., Bangalore — Following is a formula of nail polish: Celluloid small pieces 50 parts; Absolute alcohol 100 parts; Amyl acetate 300 parts; Acetone 600 parts; Spirit soluble rhodamine 0.1 part. Clean the film by boiling with soda ash solution, wash. Then cut into small pieces. Mix the alcohol, acetate and acetone in an enamelled vessel and filter bright. To this add the celluloid pieces and shake frequently until dissolved. Warm a little to get a perfect solution. Now add the colour. The product is of syrupy consistency. Pack airtight.

2935 J.C., Kanpur—Refer your queries to International Book House Ltd., Ash Lane, Opp. Clock Tower, Fort, Bombay; Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta and W. Newman & Co. Ltd., 3 & 4, Old Court House Street, Calcutta. For Oxford Dictionaries you may enquire of Oxford University Press, Mercantile Bldg., Lall Bazar, Calcutta.

2936 H.S.R., Shillong — Detailed information regarding santonine extraction is not available. You may take wormseed 4 lbs and hydrate of lime 1½ lb.

2937 S.B.W., Kegalla — Elaborate and simple process of utilising leather clippings and shavings other than that given in "Utilisation of Common Products" is not available.

2938 C.C.C., Bilimora—Process of manufacturing glycerine will appear in due course.

2939 S.S.J.L., Biaora — Your enquiry appears in Trade Enquiry Columns.

2940 R.L., Agra—Tannic acid, gallic acid, ferrous sulphate and dextrine may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane and Allied Agency, 16, Bonfield Lane; both of Calcutta.

2941 G.L.D., Poona — Process of printing negative copies of photo will appear in due course. You may enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta for a book on design of furniture.

2942 T.K.R., Nellore—Reply to your letter has been sent by post.

2944 P.R.M., Jodhpur—Refer your query to the Secreetary, Latent Light Culture, Tinnevelly.

2945 B.S.S., Ambala Cantt.—Treat mustard oil with 0.5 per cent sodium perborate and 0.5 per cent sodium sulphate and keep in the sun well covered with linen for 15 days then filter.

2946 N.R., Agra — Sheet metal working machines may be had of Alfred Herbert (India) Ltd., 13/3, Strand Road and Francis Klein & Co. Ltd., 1, Royal Exchange Place; both of Calcutta.

2950 L.B., Ahmedabad—Formulas of office gum and office paste will be found in April 1950 issue of Industry.

2960 L.C.H., Rangoon—The formula you have tried will produce moulding powder which should be used in mould for making paste articles.

2961 A.K.D., Bangalore City—The artificial slate coating on tin consists of a mixture of finely ground slate, lamp black, and a waterglass solution of equal parts of potash and soda water glass i.e. sodium silicate (1.25 sp. gr.). The process is as follows: First prepare the water glass solution by mixing equal parts of solid potash and sodium silicate and pouring over this 6 to 8 times the quantity of soft river water, which is kept boiling for about 1½ hours whereby the sodium silicate is completely dissolved. Take 8 parts finely crushed slate finely ground with little water into impalpable dust 1 part lamp black, which is ground with it and grind enough of this mass with the previously prepared sodium silicate solution as is necessary for a thick or thin coating. With this compound the roughened tin plates are painted as uniformly as possible and allowed to dry. September 1942 issue of Industry is not available.

2962 M.A., New Delhi—All the dyes you require may be had of Imperial Chemical Industries (India) Ltd., 18, Strand Road; Fuzle Hussein & Bros., 44, Armenian Street and Champalal Agarwala, 45, Armenian Street; all of Calcutta.

2963 J.S., Delhi Cantt. — For waterproof and canvas holdall enquire of Bengal Waterproof Works (1940) Ltd., 32, Theatre Road, Calcutta; Hari Ram & Co., 171, Harrison Road, Calcutta and Bharat Waterproof & Dyeing Works, 91, Dharmtala Street, Calcutta.

2964 G.L.S., Srinaga—For sheet glass enquire of Basanta Kumar Bakshi, 56-57, Canning Street; Bakshi & Mandal Co., 57, Old China Bazar Street; Deb K. Law & Co., 7,

Swallow Lane and Fotic Lal Seal & Sons, 10, Swallow Lane; all of Calcutta.

2965 G.P.J., Jaipur—Process of manufacturing shell buttons will appear in due course.

2966 C.P.C., Coimbatore — Artificial silk thread may be had of Gordhandas Ishwardas, 93, Tambu Kanta, Pydhonie, Bombay; Hazarat & Co., People's Bldgs., Sir P. Mehta Road, Fort, Bombay; Kundanmal Ramlal, Souri Bldg., 78/80, New Hanuman Lane, Bombay; Ram Kisandas Sagarmal, 354, Kalbadevi Road, Bombay 2 and Venkatnarayan Paeruni, Matunga Plot No. 275, Bombay.

2967 A.K., Nagercoil—For sugar candy making no machine is required. Iron pots with perforated bottoms are required for pouring the syrup to crystallise. Some iron pans are also required for boiling syrup.

2968 S.L.V.P., Sattur—Particulars of white powder sent by you are not available. You better consult a local chemist who understands Tamil.

2970 A.S.I.L., Bombay — For preserving syrup you may use salicylic acid in the proportion of 1 part acid in 1000 parts of sugar used in making syrup.

2971 K.V.N.M., Razole—Following is a recipe of pain balm. Yellow vaseline 44 parts; Methyl salicylate 10 parts; Cajuput oil 2 parts; Eucalptus oil 2 parts; Menthol 2 parts; Wool fat 20 parts. Mix thoroughly by trituration and put in wide-mouthed bottles.

2984 T.R., Madras—Following is a fromula of face powder: Rice starch 600 parts; Precipitated chalk 200 parts; Talcum 100 parts; Magnesium stearate 50 parts; Zinc oxide 50 parts. Mix thoroughly. As regards perfume you may use the following compound: Carnation pink blossom 2 oz.; Ext. of trefle 2 drs. To 12 drs. of this mixture add neroli 1 dr.; Vanillin ½ dr.; Alcohol 3 oz. The above compound is sufficient for 25 lbs.

2985 R.L.A., Raipur—Following is a list of distilleries: Mankatha Distillery, Mankatha, Monghyr; Lalpur Distillery, Ranchi and Ranchi Destillery, Ranchi.

2986 A.W.S., Delhi—You may try black japan for painting shoe eyelets.

2987 H.H., Indergarh—Following is a list of bone mills: Aladin Bone Mill, Secunderabad, Deccan; Anderson Dawn & Co., Deonar, Bombay; Atlas Fertilisers, Kidderpur, Calcutta; Ballykhal Bone Mills Ltd., 9, Theatre Road, Calcutta; Bengal Bone Mills, 3 & 5, Ram Mohan Mullicks Garden Lane, Belliaghata, Calcutta; Bone Mill & Manure Works, Feroke, S. Malabar; Empire Bone Mills, Canal East Road, Pagladanga, 24 Parganas and Standard Bone Mills, 35, Chaulputty Road, Calcutta. For learning photography you may write Indian Art School, 250, Bowbazar Street, Calcutta. Books on photography may be had of Thacker Spink & Co., (1933) Ltd., 3, Esplanade East, Calcutta.

2989 V.E.S., Kasganj—For stainless steel sheets enquire of Tata Iron & Steel Co. Ltd., 102A, Netaji Subhas Road, Calcutta.

2990 C.M.P., Kanhangad—Mica sheets may be had of Premier Mica Mining & Mfg. Co., 32, Gopi Kristo Pal Lane, Calcutta; Bombay Co. Ltd., 19, British Indian Street, Calcutta and Calcutta Mica Corporation, 161, Muktaram Babu Street, Calcutta. For lead sheets enquire of Balmer Lawrie & Co. Ltd. 103, Netaji Subhas Road, Calcutta.

2991 S.V.A., Bangalore—For acetum cantharidin enquire of Buttokristo Paul & Co. Ltd., 1 & 3, Bonfield Lane, Calcutta and Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta.

2992 N.S.R., Tumkur—Formulas of phenyle and bedbug killer will be found in Manufacture of Disinfectants and Antiseptics published from this office, price Rs. 3/7/- including postage.

2993 H.L.C., Bombay—Slate pencil making machine may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. Following is a formula of slate pencil: Powdered slate 60 parts; powdered limestone 30 parts; sodium silicate 10 parts. Knead together all the ingredients to form a plastic mass and then force it through metallic tubes of suitable diameter fitted with piston. Afterwards cut off into usual lengths and bake over a slow fire.

2994 G.S.M., Amritsar—Following is a formula of hair fixer: (a) Distilled water 700 parts; glycerine 30 parts; borax powdered 25 parts. (b) Tincture of benzoin 225 parts. (c) Essence of rose or jasmine 10 parts. Make a solution (a) and add (b) with good stirring and in a thin jet, add (c). Allow to stand for 3 to 5 days to mature. Filter and bottle. Waxes may be classified, in accordance with their origin, as follows: mineral, vegetable, animal, miscellaneous, synthetic and compounded.

2995 S.E.W., Kapurthala—Pencil making machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

2996 S.S., Nagercoil — For strawboard making machine enquire of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta and Jessop & Co., 93, Netaji Subhas Road, Calcutta. You will require straw and waste paper for manufacturing strawboard. We have no book dealing with strawboard manufacture. You may however enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta.

2997 P.L.V.P., Sunam—Chemical required for gas mantle manufacture may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane and Butto Kristo Paul & Co. Ltd., 1 & 3, Bonfield Lane; both of Calcutta.

2998 P.G.S., Jullundur City — Process of manufacturing imitation ivory and transparent plastic will appear in due course.

2998 D.R.B., Chaibasa—Process of making kharan and cheap washing soap will appear in due course.

3000 N.J.V., Murtazapur—We are not aware of snuff seeds. Glass flask is not manufactured in India. You may manufacture brahmi and amla hair oil by the process that appeared in March, 1949 issue of Industry. For glass globes enquire of Balsukh Glass Works, 7, Swallow Lane; Calcutta Glass & Silicate Works, 9, Kundu Lane; International Glass Works, 101-2, Ultadanga Main Road; all of Calcutta.

3001 S.A.W.W., Surat—Treat the oil-stained silk with benzine, then wash with any kind of neutral soap.

3002 S.C.A., Mathura—Process of manufacturing paint and varnish will be found in Prospective Industries published from this office, price Rs. 3/7/- including postage.

3003 D.N.G., Jaypur—Refer your query to the Agricultural Department of your Province.

3019 S.A.B., Hubli—Process of manufacturing fire works will be found in Home Industries published from this office, price Rs. 3/7/- including postage. You may also consult Dictionary and Manual of Fireworks by Weingart and Complete Art of Fireworks Making by Thomas Kentish. You may enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East and Standard Literature Co. Ltd., 13/1, Old Court House Street; both of Calcutta.

3022 H.L.R., Agra—In manufacturing writing ink you should use 5 tolas ink blue in the formula mentioned by you.

3023 M.A.M.K., Porbandar—For automatic machines for making slate pencils enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

3024 G.C.B., Rajakundu—Process of deodorising, decolourising and other processes will be found in Indian Perfumes, Essences & Hair Oils published from this office, price Rs. 3/7/- including postage.

3025 R.K.N., Lucknow—Plastic dies may be had of Alfred Herbert (India) Ltd., 13/3, Strand Road and Francis Klein & Co. Ltd., 1, Royal Exchange Place; both of Calcutta. Plastic machine may be had of the above firms. Plastic powder may be had of Imperial Chemical Industries (India) Ltd., 18, Strand Road, Calcutta.

3026 J.C., Kumbakonam—Process of manufacturing chalk crayons appeared in January, 1950 issue of Industry. Process of manufacturing wax pencil appeared in January 1951 issue of Industry.

3027 R.S.P., Etawah—Following is the process of preparing lemon juice: To prepare lemon juice cut each lemon into two or more pieces, place the pieces in cloths between rocks and press it. The yield of juice ranges from 35 to 40 per cent. A large proportion of oil is included, but is removed by passing the juice through a separator, which at the same time removes some of the suspended material. Next the juice should be sterilised by heating at 70°C for 30 minutes. There is very little loss of flavour. When kept at a low temperature it retains its rich lemon flavour for many weeks and if frozen quickly it will keep for a long time. Eventually, however, a peculiar flavour similar to lime flavour seems to develop. The exclusion of all air in this juice is important but even this exclusion was not successful in controlling the change of flavour. For sugarcoating fruit you have to use machine which may be had of Prabartak Commercial Corporation Ltd., 61, Bowbazar Street, Calcutta.

3028 K.P.G., Tanjore—Process of block making will be found in Independent Careers For The Young published from this office, price Rs. 3/7/- including postage. Block making materials may be had of Photographic Stores & Agency Co. Ltd., 154, Dharamtala Street, Calcutta.

3030 S.R.C.L., Giddarbaha—Following is a recipe of cycle oil. Refined castor oil 1 lb.; refined cotton seed oil 1 lb. Mix and put in cans.

3031 K.S., Vegeswarapuram—Bone crushing machines may be had of Marshall Sons & Co. Ltd., 99, Netaji Subhas Road, Calcutta and Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta.

3043 O.I., Delhi—Following is a formula of playing card varnish: Sandarac 60 tolas; Mastic 20 tolas; Camphor 1 tola; Turpentine 2½ oz.; Ether 2 oz.; Rectified spirit 2 oz. Macerate the ingredients for several weeks until fully dissolved. The result is a limpid, colourless brilliant varnish.

3044 T.C., Pallom—For fountain pen equipments enquire of the following firms: Bharati Stores, 86-4, Harrison Road; College Stores, 55, College Street and Nilmoni Dutt & Co., 80-3, Harrison Road; all of Calcutta.

3045 K.J.A., Trichur—Full address of the enquirer was published in October 1950 issue of Industry.

3046 K.V.S., Bangalore—Paper pin making machines may be had of Baird Machinery Co., Bridgeport, Connecticut, U.S.A.

3047 H.S.S., Hariana—Raw materials for perfumes may be had of Paradise Perfumery House, 7, Colootola Street; F. N. Sarkar, 33, Canning Street and Calcutta Chemical Co. Ltd., 10, Bonfield Lane; all of Calcutta.

3048 J.P., Allahabad—Process of nickel plating will be found in Electroplating In Practice by M. N. Mitter published from this office, price Rs. 3/7/- including postage.

3055 T.P.D., Ballia—Ink tablet making machine may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

3056 S.V.P., Bombay—For cardboard box making machine enquire of John Dickinson & Co., 8, Clive Row, Calcutta.

3057 R.P.D., Kanpur—Wire nail making machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. Collapsible tubes may be had of Metal Box Co. of India Ltd., B2, Hide Road, Kidderpur, Calcutta.

3058 G.N.S., Moradabad—Refer your query to Consul General, Panorama, 203, Walkeshwar Road, Bombay and Commercial Secretary, Legation of India, Karadat Marian, Baghdad.

3059 P.L.N.S., Bhatapara—Distilling apparatus may be had of Adair Dutt & Co. Ltd., Stephen House, 4, Dalhousie Square, Calcutta and Scientific Supplies (Bengal) Co., C-37, College Street Market, Calcutta.

3060 B.C.I., Khurda—For envelopes enquire of the following firms: Standard Envelope Manufacturing Co., 73, Baitakkhana Road; Manna & Co., 12, Corries Church Lane and Overland Trading Co., 67, Ezra Street; all of Calcutta. For tambulin enquire of Indian Herbs Store, 31, Mullick Street and Banshidhar Dutt, 126, Khengrapatty Street; both of Calcutta. Dyes may be had of Hansraj Vishram & Co., 2A, Armenian Street and Imperial Chemical Industries (India) Ltd., 18, Strand Road, both of Calcutta. For porcelain ware write to J. N. Sain & Bros., 110, College Street, Calcutta. Formula of hair oil compound will appear in an early issue.

3061 D.D., Almora—For dal making machine write to Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta and Volkart Bros., 8, Netaji Subhas Road, Calcutta.

3062 M.C., Poona—Herbs and spices may be had of Indian Herb Store, 31, Mullick Street and Banshidhar Dutt, 126, Khengrapatty Street; both of Calcutta.

3063 N.D.H., Srinagar—Refer your query to Calcutta Dental College Hospital, 114, Lower Circular Road, Calcutta.

3064 G.K.P., Kalyan—A good formula of making ink appears elsewhere.

3065 F.C.D., Mogra—Formulas of tooth powder and vermillion will appear in due course.

3066 M.A., Jamaica—For taking agency of Indian goods you should advertise in Industry. You may also consult Industry Year Book & Directory and write to the parties who may be interested in the line suggested by you.

3067 B.A.A.J., Portonovo—Bryl Cream is a patent preparation and its exact formula is not available.

3068 P.S.B., Lashkar—Following is a list of type foundries: Eastern Type Foundry, 18, Brindaban Basak Street, Calcutta; India Type Foundry, 1, Nirode Behari Mullick Rd., Calcutta; Kalika Press Type Foundry, 20, D. L. Roy Road, Calcutta and N. N. Sanyal & Sons, 28A, Keshab Sen Street, Calcutta.

3069 Y.P., Ganjam—We have no book on toy manufacture. Process of manufacturing chalk crayon and sealing wax will be found in Prospective Industries published from this office, price Rs. 3/7/- including postage.

3070 New Delhi—We have no book on aluminium industry. For plastic sheets and rods enquire of Plasto Iron (India) Ltd., Dum Dum.

3072 M.Y.K., Muzaffarnagar—Electroplating equipment may be had of Alfred Herbert (India), Ltd., 13-3, Strand Road, Calcutta.

3073 U.C.C., Kanpur—For colour and artist's materials enquire of Aukhoy Kumar Laha, 1, Dharamtala Street, Calcutta.

3088 Y.C., Agra—Chemicals you require may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta and Bengal Chemical & Pharmaceutical Works, 164, Manicktola Main Road, Calcutta. Process of manufacturing baking powder, hydrochloric acid, etc. will appear in due course.

3089 S.K.M., Bombay—All the information you require will be found in Industry Year Book & Directory 1951 price Rs. 16/4/- including postage.

3090 J.J.J.C., Bombay—Following is a list of fountain pen dealers: Anundo Chunder Ghose, B51, & 81, New Market, Calcutta; Bharati Store, 86-4, Harrison Road, Calcutta; College Store, 55, College Street and Enterprising Society, 17-3, Baitakkhana 2nd Lane, Calcutta. An exhaustive list of fountain pen dealers will be found in Industry Year Book & Directory published from this office, price Rs. 16/4/- including postage.

3091 D.P.S., Lucknow—We have no book on tile manufacture. You may write to Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta for a book on tile manufacture.

3092 R.A., Raipur—Following is a list of distilleries: Amritsar Distillery Co., Kshesha, Amritsar; Alembic Distillery, Baroda; Asansol Distillery, Asansol; Bengal Breweries Ltd., 6, Mission Row, Calcutta; Carew & Co. Ltd., 4, Fairlie Place, Calcutta and Cawnpore Distillery, Coppergunge, Kanpur. An exhaustive list of distilleries will be found in Industry Year Book & Directory published from this office, price Rs. 16/4/- including postage.

3093 P.S.N., Hebri—We have no such book; you may enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta for the book required.

3094 K.P.M., Big Kanchupuram—Process of manufacturing scented hair oil and snuff will be found in April 1950 issue of Industry. Process of manufacturing incense sticks (agarbatties) and tobacco preparations will be found in January 1951 issue of Industry.

—REVIEW OF BOOKS

MONEY—AN ANALYTICAL STUDY OF MONETARY THEORY AND PROBLEMS by S. M. Tiwary, M.A., Asst. Prof. of Commerce, Banaras Hindu University. Distributors: Banaras Book Corporation, Lanka, Banaras.

Money plays a vital role in a modern community and wields tremendous influence over employment, production, and prices as well. Hence in all countries there is some sort of monetary authority which exercises control over the behaviour of money and the mechanism for the successful operation of the control. The monetary problems are concerned with the processes connected with the settlement of accounts with foreign countries for imports and exports, freights, services, etc. and the determination of a rate of exchange which will be beneficial for the country and can be maintained internationally without undue fluctuations. Monetary policy needs also be framed in a way that internal and external equilibrium can be promoted. Measures both direct and indirect have therefore to be taken by all well-meaning Governments for the control of exchange rates. International monetary plans are also orders of the day to secure monetary co-operation and collaboration between nations and to secure a balanced growth of international trade and to avoid competitive exchange depreciation. The International Monetary Fund has thus come into being and an International Bank has been set up to make available resources to countries in need. Finally comes the banking system of the country to finance the agricultural and business needs. The book deals with all these problems one by one in separate chapters. General readers and undergraduate students of economics and commerce will get a good idea of the functions of money from the book.

CURRENT AFFAIRS 1950. Edited by Dr. A. N. Bose, M.A., P.R.S., Ph.D. Published by A. Mukherjee & Co., Ltd., 2, College Square, Calcutta. Pages 911, price Rs. 8-8.

The Volume is intended to serve as an annual record of the march of events in all spheres of national activities. It also chronicles the trends underlying the series of events.

The first part of the Volume relates to a useful, albeit brief, narration of the emerging political pattern in the world under the stress of the quick succession of political events. This portion also embodies information about the latest developments in the domain of science, literature and even about the latest records made in the field of sports.

The second part of the Volume is mainly devoted to India and Pakistan. Starting with a sketch of the latest achievement by way of constitution making and of the chief political issues coming up for discussion, the Volume surveys the economic conditions in India and Pakistan as also the latest developments in science and technology, education, art and literatures, sports, etc. A large mass of Indian, Pakistan and World statistics have been added to the Volume for ready reference by the readers. There is also a handy compilation of Who is Who in India and Pakistan. Inclusion of a number of maps also enhances the value of the Volume as an annual recorder. The volume will be not only helpful for the general readers but also be a useful guide for the examinees preparing for the various competitive examinations on general knowledge.

NOTICES & REVIEWS

(Manufacturers sending specimens and samples of their products for notice and review may please note that no notice is published of medical preparations and allied substances in this section.)

DEPILATORY POWDER

We have received from Bala Industries Ltd., Post Box No. 3, Moradabad, U. P. one packet of 'Lomna' brand perfumed depilatory powder.

NEW YEAR CALENDARS

We are glad to acknowledge new year calendars from the following:—Heatly & Gresham Ltd., Calcutta 23; B. G. Trading Corpn., 47-1C, Garpar Road, Calcutta 9; Chemical Agents Ltd., 25C, Swallow Lane, Wardley House, Calcutta; Bengal Scientific & Technical Works, Ltd., Manufacturers of Leo Mantles, 20-3, Aswini Dutt Road, Calcutta 29; Universal Cardboard Box Factory, 54, Ezra Street, Calcutta; Philips Electrical Co. (India), Ltd., 2, Heysham Road, Calcutta; Eastern Paper Syndicate, 133, Canning Street, Calcutta; and British Information Service, Post Box No. 496, Calcutta.

TRADE ENQUIRIES

(To communicate with any party write to him direct with name and address given below meantioning Industry.)

2939 Shiv Sahai Jamna Lal, Biaora, Madhya Bharat—Want to be put in touch with firms interested in neem oil, neem seed and neem cakes.

2943 B. R. Tibarewala, Ratan Nagar, Bikaner—Want to be put in touch with the dealers in rough semi precious stones, gems and jewellery.

3021 Hardit Singh Rahi, E.H.-28, Ladowali, Jullundur—Wants to be put in touch with the wholesale stockist of ebony wood.

3128 R. Poonuswamy Chetty, 17-1, China Elliah Lane, Coimbatore—Wants to be put in touch with the importers of American, English and other national pictures at Bombay, Calcutta and Madras.

3129 Lakshmi Kanta Das, 504, Nowjan Road, Uzan Bazar, Gauhati—Wants a financier to finance a good lucrative business.

There was a time when ignorant people marvelled at the magic of producing light without the aid of fire by clicking a switch on. But to-day electricity is no mystery to the common people. This is an electricy age when you cannot live without it. Whether at home, or in factory, you have electricity at your service. It is a great power that modern civilization has placed in your hands and man has used it for all sorts of domestic and industrial uses. It gives you light, works your fan, air-conditions your room, and works through various devices such as ovens, irons, frigidairs, heaters, radios, door bells to add comfort to your family life. But at times small troubles crop up and things don't work the way they should. You then go crazy and call in an electrical engineer for doing most ordinary things that need not always be beyond

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Written specially for

THE COMMON HOUSEHOLDER, THE AVERAGE HOUSEWIFE, FOR JUNIOR TECHNICIANS AS WELL AS THOSE IN THE TRADE OR WHO WANT TO ENTER IT.

Edited, Printed & Published by K N Banerjee, for Industry Publishers Ltd.,

XLI. CALCUTTA, MARCH, 1951 N

INDUSTRY.

A Monthly Magazine for Manufacturers and Businessmen.

Published in the first week of the month by
INDUSTRY PUBLISHERS LTD.,
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EDITORIAL CONTENTS FOR MARCH, 1951

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Last day of accepting advertisement is the 10th day of the previous month. Any order for alteration or correction of copy is not entertained after that day.
Advertisement rates for ordinary and special position, both casual or contractual, are sent on request.

CORRESPONDENCE.

All enquiries regarding industrial or business information should be addressed to the Editor. Contributions and articles for review and notice should also be sent to him.
All enquiries regarding the Subscription or Advertisement Departments should be addressed to the General Manager.

OFFICE HOURS.

Editorial Department — 11 A.M. to 4 P.M. on weekdays and 11 A.M. to 2 P.M. on Saturdays.

Subscription and Advertisement Department 10 A.M. to 5 P.M. on weekdays and 10 A.M. to 2 P.M. on Saturdays.

—CLASSIFIED BARGAINS

[AD]VERTISEMENTS under this head of small announcements cost 4 As. per word, minimum [Rs]. 3 payable by Postage Stamp or M.O. with order. No vouchers given.

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[Ba]ttery
[Bi]lls, Bonds, Hundies
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[Br]ushes
[Bu]tton & Ivory
[Ca]rbon Brushes
[Ca]rdboard Boxes
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[Ci]nema Distributors
[Cr]ude Drugs
[Cy]cles & Cars
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[Ed]ucational & Instructions
[Ex]pert Wanted
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[Fi]nancial
[Fl]oors & Floor Covering
[Fo]ods & Provisions
[Fi]re Clay
[Fi]re Bricks
[Fr]uit Essencess
[Ga]rdening & Agriculture
[Im]porters & Exporters
Jewelleries
Lables
Machinery & Hardware
Medicines
Miscellaneous Advtg.
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Paint & Colours
Patents & Trade Marks
Perfumery & Toilets
Personal & Professional
Plywood & Bobbin
Potteries
Printing & Stationery
Radio & Electric Goods
Rubber Goods
Rubber Stamps
Sale & Purchase
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Situation Wanted
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Small Tools
Sports, Music & Arts
Springs
Stamps & Coins
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Wanted agents and stockists for Ayurvedic [me]dicines and patent preparations. Apply to [Ay]urved Research Institute, Santipur, Nadia. 326 AA

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Bangalaxmi Leather Works, 10/B, St., James [Sq]uare, Calcutta—Wanted Stockists for money [pu]rses and Ladies Hand Bags. 63 AA

Wanted territorial agents for disinfectant [ins]ecticide etc. Apply Post Box 6603, Bombay 19. 325 AA

D. D. Malam—A Soothing Ointment for all [Sk]in Diseases, never stains on clothes. Wanted [Ag]ents, Mahatma & Co., Jorasanko, Calcutta 7. 80 AA

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For "Organisers and Agents" on suitable [ter]ms, apply Oriental Provident Insurance Ltd. Canning Street, Calcutta. Phone Cal. 7175. 76 AA

Salary Rs. 95/- plus commission to suitable [Rep]resentatives. Apply Valley Tea Corporation, Durga Charan Doctor Road, Calcutta—14. 83 AA

For Calendars, Diaries, Handbags, Purses, [Ha]nd-Gloves, Apply Bengal Leather Industries, [..]c. St., James Square, Calcutta 67 AA

AGENTS WANTED,

Fountain Pen Rubber Tubes our own make. Enquire Emersons (India) C-94, Rajindernagar, New Delhi. 296 AA

Wanted Travelling Agents for Paint brushes and tablewares. Apply H. Usman & Co., 339, Abdulrehman Street, Bombay 312 AA

Wanted:—Agents and Whole-salers for our Button. Indian Button Traders, 9, Motilal Mitra Lane, Calcutta 11. 322 AA

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Wanted Agents, Organisers and Stockists. For pushing our medical products, for terms apply:—Medical Health Institute, Ltd., 82, Harrison Road, Calcutta 9. 140 AA

Dry Colours—Chinese & Prussian Blue, Chrome-yellow, Fast Red, Etc. Wanted Agents & Stockists everywhere. Indian Chemical & Colour Works, 66, Simla St., Calcutta 6 108 AA

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Wanted Stockists and Agents for our World renowned Chaulmoogra Preparations Perfumery & Toilets and Patent Medicines, Washing Soaps, etc., write to—P. K. Sen's Drugs & Chemical Works, 105/1, Ultadanga Main Road, Calcutta 4. 5 AA.

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Vou Trading Co., 8, Clive Row, Calcutta. Dealers, stockists for both new & 2nd Hand Engines, Boilers & other Machineries. 73 MA

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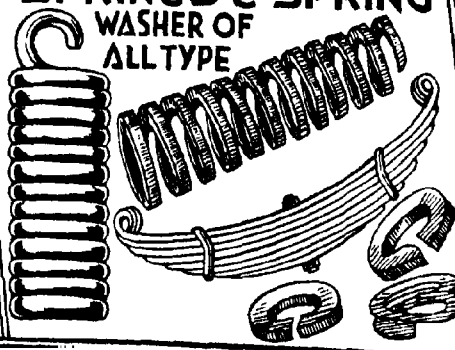
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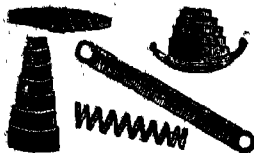
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Industry

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K. N. BANERJEE.

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IMPORT POLICY

THE supply position of various industrial raw materials in the country has assumed such critical magnitude that it has got to be improved immediately if the economic structure of India is to be kept unimpaired.

In their anxiety to redress the adverse balance of trade, the Government of India have since devaluation of the rupee been following a policy which while encouraging export trade strictly restricted import trade. This will be borne out by the fact that while during 12 months following devaluation the value of our exports increased by 14 per cent as compared to previous 12 months, the quantum of our imports dropped by no less than 22 per cent.

The imports being thus curtailed mercilessly have seriously affected the industries of the country in as much as some of these are essential materials for multifarious industries of India. The reduced imports, as such, constitute an immediate or potential impediment in the way of our over-all industrial production which in 1950 fell short by 2 per cent as compared with 1949. The decline in production in industries depending on foreign markets for their raw materials must be much more than this.

This policy of restricted imports is to be specially deplored because it has prevented India to stock-pile industrial raw materials in the wake of the re-armament drive which has been gaining momentum in the international sphere, since the outbreak of the Korean War. While admitting theoretically that India must not rely on outside market, it must be pointed out that in the present state of India's economic conditions imports of essential materials are necessary for stepping up at industrial production to the installed capacity and providing the primary necessaries of life to the people.

Hence the appeal made by Shri Tulsidas Kila Chand, President of the Federation of Chamber and Industries, to the Government of India for revision of import trade policy is most timely. The appeal seems to have borne fruit. The Government of India is now considering the liberalization of import policy and now that India's foreign exchange is comfortable, the Government thinks of freely licensing raw materials required for industrial production and other vital commodities,

CURRENT TOPICS

INDIAN CENSUS OF 1951

The 1951 census of India, now in progress in *full* swing, will be the biggest scientific census in the world. Its special feature is that in addition to recording the strength of the population it will furnish valuable data showing how the life of the people has been affected during the past decade. The economic section is also a new feature, which is likely to reflect a true picture of the economic condition of the people and which is also expected to help the Government to plan for the nation as a whole.

The census is expected to bring out detailed information relating to small territorial units, and the Government propose to publish for each district a census hand book based on such information. Simultaneously with the population census, a census of small-scale industries will be taken. This is expected to fill a gap in the statistical data in the country. Caste and community distinction will not figure in the census except to the extent necessary for purposes of the Constitution. Special arrangements have been made to compile provisional totals of the entire population in the shortest possible time and it is proposed to publish them before the end of April. Steps will also be taken to publish the main tables which will be of three kinds—general population table, economic tables and cultural tables before the end of the year.

INLAND NAVIGATION

Inland navigation occupied an important place in the country's economy in the days before the railways were established. But recently the waterways of India are in an unnavigable condition. Yet in the opinion of experts like Mr. Otto Popper deputed by the E.C.A.F.E. in 1950 to advise the Government of India on the development of inland waterways, India's waterways can become equal partners to her railways provided these are systematically organised and exploited. It has been suggested that country boats can be effectively grouped into co-operative units which will offer security to the cargoes and thus draw more traffic to the waterways. It is also considered that tugs of touring fleets of boats at considerably greater speed should be used. Organised in this manner freight can be brought down to about half an anna per mile against two annas by the railways. Among the plans, at present in hand or under contemplation for the development of inland navigation in the country, may be mentioned the following:—The construction of the Hirakud Dam in Orissa, it is stated, will make the Mahanadi navigable for 300 miles down the sea, the Kakrapara Project in Bombay provides for navigation from the sea-face near Surat up-to the reservoir of the Dam at Kakrapara and 50 miles further inland. Similarly, the Damodar Valley Project in Bihar and West Bengal envisages the construction of a navigation canal linking up the lower Raniganj coalfields with the Hooghly River. The revival of water traffic on other navigable rivers e.g. on the Ganga, from Buxar to Allahabad, and on the Goghra, up-to Bahram Ghat is being seriously considered. Investigations carried out also show that it is possible to connect the western and eastern coasts of India by inland navigation channels. Similarly, it is possible to connect Assam and West Bengal by a dual-purpose water course.

M.P.'S AGRICULTURAL PROBLEMS

The Madhya Pradesh Agriculture Policy Committee, appointed last year

with terms of reference covering agricultural operations and animal husbandry, is reported to have recommended extension of irrigation of the wheat zone after developing a rust-resistant variety that can be sown late and harvested early, utilising the initiative of cultivators and the people in harnessing perennial small rivulets and rivers. It also stresses the need for detailed village planning for research and assessing results through co-ordinated pilot schemes and facilities for agricultural staff in tahsils for free development research and propaganda work. The Committee further urges the development of cottage industries on a competitive scale through mechanisation and raising of the efficiency of labour. It is also believed to have suggested that agricultural finance should be built up by a "compulsory contribution," on the lines of land revenue, during the normal years.

REGIONAL INDUSTRIALISATION

Shri Hare Krushna Mahtab, India's Minister for Commerce and Industry, has invited the opinion of the industrial and commercial community of the country about a scheme of regional self-sufficiency leading ultimately to national prosperity on the lines of Japan's post-war recovery. The industrial structure in India has led to centralisation in urban areas to the neglect of rural areas. If a scheme like this is drawn up, the industries would be more equitably distributed throughout the country and the rural industries will receive a new base of life. Big industries are not possible in rural areas whereas the small scale industries offer great scope for development. Hence all schemes for regional industrialisation should meet active sympathy of all economic thinkers. In this way alone the villages can be improved and a large section of the people will be benefitted. According to the Minister, one experienced man would be placed in charge of a region and supply articles, with the administrative machinery behind, to help it. But simple planning will not do. It is necessary that a nation-wide activity starts to work out the scheme and help industrialisation of the entire country.

GOVERNMENT INVESTMENTS IN INDUSTRIES

In reply to an enquiry the Finance Minister Mr. C. D. Deshmukh said in Parliament that during 1947-1950, the Government of India had invested Rs. 27.4 crores in fully owned industrial concerns and Rs. 22 lakhs in partly owned concerns. This did not include investment in defence factories. Many concerns were still under construction and the Hindustan Aircraft Company, which was the only important concern under production, had made a small profit of Rs. 14.5 lakhs in 1948-49 and Rs. 5.8 lakhs in 1949-50. The Government had not yet decided whether the work of the Government housing factory should be speeded up or not. Among the other Government-owned industrial concerns, the Hydrogen Factory at Agra, the Indian Rare Earths Factory and the Sindhri Fertilizers Factory were expected to start production early. The Penicillin Factory would take some time while the Chittaranjan Locomotive Works, the Mathematical Instruments Factory, the Hindustan Aircraft Limited and the Indian Telephone Factory were already working.

AUTOMOTIVE INDUSTRY

Within a short time the automotive industry in India has been in a position to manufacture many essential parts of motor vehicles and it is hoped that if the present pace of progress is maintained, in the near future more than 50 per cent. parts of the

entire motor car will be Indian-made. The establishment of the automotive industry in this country has been a landmark in the growth of its industrial development after the end of the last war. This essential gap in her industrial structure has been filled by the setting up of two automotive manufacturers in India who are equipped with the latest plants and equipment of manufacture of motor cars and other vehicles, as also from all their essential power units. The parts now being manufactured by the industry include bus-bodies, cabs, mufflers, exhaust and tail pipes, gear-box, front-suspension, radiators, rear axle and the engine and various other rubber, leather and textile parts needed for the same. All efforts are being made by the industry to produce and obtain as many parts from internal sources as possible and it is believed that before long most of such other parts which were still imported, such as electrical equipment, brakes, steering, clutches, wheels etc. will all be made in India. On account of the various highly technical and skilled jobs to be performed it naturally takes some time before the industry is in a position to produce all that is needed for automotive manufacture. But gradually as the industry is gaining more and more experience, it will be in a position to manufacture and supply all that is required by the country. It is however unfortunate that some of our national policies have been directly responsible for discouraging the growth of motor transportation which has also affected the production progammes of the industry. It may be recalled that compared to one motor vehicle for 16 persons in Great Britain, six persons in the U.S., seven in Australia and 18 persons in France, India has one motor vehicle for over 1,300 persons. On the other hand, the sales tax, the road taxes, and petrol tax in this country combine to make the taxation of motor vehicles more than it can safely bear. The Government realises a sum of Rs. 28 crores by way of taxation of road vehicles which works out an average of Rs. 1100 per vehicle per year. This when compared to the estimated capitalised value of roads at Rs. 200 crores appears to be very high.

RADIO AND ELECTRONICS EXHIBITION

A Radio and Electronic Exhibition, organised on an International scale, is proposed to be held in India in February next year. India's geographical position is admirable for the purpose, since it is the natural focal point holding the key to better business in Asian countries. An exhibition of this nature showing all the developments in the science of radio and electronics will not only be of immense benefit to the people of India but also of the neighbouring Asian countries. Sponsored by the All-India Radio Merchants' Association the exhibition will be the first of its kind in Asia and is expected to create great interest in the fast developing science of radio and electronics. The organisers hope to get a high power television set for exhibition to demonstrate the potentialities of telecasting, and the progress it has attained in Western countries. In addition, there will be radio receivers and components from midgets to giants, radio and electronic appliances used in industry, medical treatment, defence, communication and navigation of aircraft, ships and railways, and sound and amplifying equipment for the cinematograph and public address. It is understood that to organise and supervise the work, an Exhibition Society is being formed by Indian and foreign manufacturers and will be registered shortly.

EXEMPTION FROM INCOME TAX

On October 28, 1948 the Government of India had announced that new indus-

[illegible]

[illegible] which would have commenced production in India before March 31, 1951, would be allowed exemption from incometax for a period of five years on their profits upto a limit of six per cent per annum of the capital employed in the undertakings. Effect to this announcement was given by providing that the exemption would be available in the assessments for and upto the year 1953-54. As the period within which firms would be elegible for tax exemption will be shortly expiring the Government of India have decided to consider favourably cases of firms commencing production after March 31, 1951. Each case where delay in commencing production was unavoidable will be considered on its merits. Legal provision enabling the Government to extend such tax concessions already exists.

"GROW MORE FISH" PLANS

Shri K. M. Munshi, India's Food and Agriculture Minister who was inaugurating the third annual meeting of the Indo-Pacific Fisheries Council said that of the total production of fish in India, only about one-third came from inland sources. The development of inland fisheries does not require any large capital outlay. But one great difficulty in the way of extending piscicultural operations so far has been the lack of fish seed of suitable varieties in certain parts of the country. The Government of India have now made arrangement to produce and transport large quantities of fish seed from surplus to deficit areas. As a result of these efforts, more than 70,000 acres of "fallow" waters have been stocked and converted into productive fisheries during the last four or five years and additional production from this source in the current year is estimated at nearly five lakh maunds. India's vast reserves of fish-food undoubtedly lie in the sea and their proper utilisation is [illegible] one of our great problems. We are already producing twice as much marine fish as the marketable surplus of fresh water fish, but the difficulty is that not even half of the marine fish production is used as food in the country—about 50 per cent. being sun-dried or converted into manures chiefly for export. In the development of marine fisheries, therefore, it seems desirable to provide refrigeration and quick transport for the catches and to convert the surplus into suitable processed food acceptable to the taste of the Indian public. In such matters, while consumers' preferences must be clearly borne in mind, it should be realised that through proper marking methods, consumers' preferences can also be influenced. It is reported that during the current year 30 fishery schemes are in operation in various States.

ATOMIC ENERGY MINERALS

Valuable deposits of atomic energy minerals such as uranium, beryl and monazite have been discovered in India, according to the report submitted by the Atomic Energy Commission to the Government of India. While the exact location of these minerals belts have not been mentioned, the rare mineral survey station of the Atomic Energy Commission, which has been carrying on a country-wide survey for locating these deposits say that these ore-bearing belts have been discovered in various parts of the country. It is understood that experimental research on these ores and methods of their commercial utilisation are being conducted in special laboratories and factories.

TANNING INDUSTRY

Bihar has a cattle population of over 115 millions. The goat population is about 54 lakhs and the sheep population

is about 10 lakhs. The hides and skins of all these animals, which are utilised for commercial leather, are stated to rank among the best to be found anywhere in the world. The bark required for the tanning industry is also available in the province in plenty.

To utilise the carcasses of dead animals and to improve the social and economic conditions of the Chamaras (shoemakers by caste) and to open new avenues of employment for the educated middle classes, the Government of Bihar have sanctioned a scheme for one year for the present for the development of small-scale tanning and leather industries in the province at an estimated annual cost of over Rs. 54,000 recurring and Rs. 16,000 non-recurring. The endeavour is praise worthy.

TRADE BETWEEN INDIA AND INDONESIA

A three-fold increase in the volume of trade is envisaged in the trade agreement recently contracted between India and Indonesia. It is a bilateral one and the first trade agreement with Indonesia. It aims at trade of the value of Rs. 4.62 crores on either side in a year. The principal commodities under the agreement which India would export to Indonesia include cotton piece-goods, knitted goods, agricultural machinery, cement, shellac, tobacco, jute goods, etc. while imports from Indonesia will include palm oil, copra, coconut oil, spices including betel nuts, tin, tapioca maize, teak wood, raw hides and skins.

RUBBER FACTORIES

It is to be regretted that the rubber-factories in West Bengal employing over 3,000 men are threatened to be closed down soon for want of adequate supply of raw rubber to keep the factories fully at work. It is apprehended that these factories are now left only with a very little stock. The Indian Rubber Manufacturers' Association expresses the view that unless Government takes immediate steps to ensure supply of South Indian rubber, these factories will have to close down in a short time. Freezing of all stocks of South Indian rubber by Government to maintain a normal flow of rubber from producers to manufacturers do not solve the problem. This is due in some degree to the slow moving of Government machinery and also to the obstructionist policy of certain stockists to release goods when orders had been issued for the purpose. It is further learnt that manufacturers are also facing extreme difficulty in obtaining various vital raw materials coming from the U.K. and U.S.A. as suppliers in these countries are to-day unable to meet Indian requirements. Other countries have been stock-piling essential raw materials required by their indigenous manufacturers. and the Government of India should not lag far behind in this respect.

INDIAN EXHIBITS IN LONDON

The second of a series of exhibitions sponsored by the Indian High Commissioner in the the U.K., with the object of presenting an overall picture of the economic resources of India, was opened at India House, London. The importance of India as a steel producing country was emphasised in the exhibition and an impressive exhibit was a large scale model of the Tata Iron and Steel Company's works at Jamshedpur, the largest single steel producing unit in the Commonwealth. The other exhibits provided examples of the 35 different minerals now mined in India whose total annual production is valued at over £70,000,000.

As a reminder that India is the third largest producer of tobacco in the world, sample of various types of tobacco grown in India were displayed.

CHEMICAL SALVAGE

THE rate of exploitation of all the world's resources of materials has increased at a rapidly increasing rate during many generations and it has now reached a stage where it must cause us all active concern. Thus, on the world scale there is the most urgent need for economising in the use of raw materials, preventing waste and upgrading waste so that it becomes usable. In this article, which is summarised from CHEMICAL AGE some important sources have been discussed.

SALVAGE FROM WASTE

Scope for chemical salvage, however, arises in the individual factory which is discharging a waste product. Here very often a chemical investigation of the process as a whole results in salvaging further saleable material from the waste or even in eliminating the necessity to discharge waste. On the national scale one finds interest in salvage which may develop due to the fact that country is experiencing shortages of particular elements or of more complex materials. Attention is then directed to economising in the use of these materials, substituting for them or salvaging them where they have to be used and salvage is possible.

The shortage may be due to absence or poorness of natural deposits, or foreign currency—notably dollars—or even to political opposition to certain purchases. In some areas, usually tropical, conservation of water is a prime necessity. These are very often what one may call "local" shortage. On a world scale, however, and irrespective of local or financial difficulties, there is a serious threat of world shortage of many resources.

SUBSTITUTES FOR METALS

A large number of workers have pointed out that this is notably true of the elements copper, tin, lead and mercury, which are in danger of early absolute exhaustion. Here there must clearly be an immediate search for substitutes as well as efforts at conservation and re-utilisation. It is obvious from the varying rarity and modes of occurrence of elements that, in terms of social needs, it is not necessary to consider the salvage of all elements but only of particular ones.

Some elements are common and found in virtually unlimited deposits of high concentration. These include calcium and silicon in the earth, sodium and chlorine in sea-water, nitrogen and oxygen in the atmosphere. These need not be considered. A further group are abundant elements which are found in high concentration in relatively limited deposits. This group includes iron, aluminium, magnesium, phosphorus and sulphur. Here the danger arises from the need to go to ever poorer sources with a rise in cost of extraction.

Assessed in this way, the six elements which prove to be most important are carbon, sulphur, phosphorus, iron, tin and lead. Of these, carbon is unique in that its importance is mainly as a source of energy. Thus, the development of industrial atomic energy might reduce the importance of carbon in this list. In any case, the problem is one concerned with greater efficiency in use, rather than chemical salvage. The pooling of heat and power supplies between adjacent undertakings or even whole groups of undertaking would very greatly increase thermal efficiency in industry and help conserve carbon.

Some data are available on the extent of wastage of sulphur, but in general estimates of material which might be recover-

[illegible] either as elements or compounds—are lacking. Sulphur contained in the annual output of British coal amounts to about 3 million tons, but only about 100,000 tons are recovered. In respect of paper, the Waste Paper Recovery Association makes analyses of the tonnage conserved in this country and the amount collected for salvage, but the discrepancy here is due to failure to collect the used paper and is not a chemical problem.

Under the auspices of the Board of Trade, there exists a National Industrial Salvage and Recovery Council, which has been unable to give estimates of the scope of possibilities in Britain. Data appear to be available only where recovery is currently being practised. For instance, Bradford Sewage Committee reports that from that city's very specialised effluent (from wool-cleaning) they recovered and sold grease to the value of £238,158 and fertiliser worth £22,158 last year alone. Over that past 42 years Bradford has received more than £3½ million for these products.

On the other hand, the sulphite mills of the world, treating timber to convert it into paper have been estimated to run to waste half-a-million tons of sugar and 1½ million tons of lignin annually. The mixed pentoses and hexoses of which these sugars consist are capable of producing food yeast. By the end of 1944 the Germans were producing 16,000 tons per annum of food yeast in 12 factories, using wood sugars in sulphite waste liquor as substitutes in many of the cases. Hydrolysed wood was used in the others. In Sweden the pink fat yeast Rhodotorula gracilis produces from sugars a fat resembling palm oil, with quite high efficiency.

PREVENTABLE WASTE

In most industries, a great deal of preventable waste still goes on and, like other sicknesses, this one needs immediate first-aid, then medium-term and long-term courses of treatment. This article is not intended to consider the question of looking for fresh sources or the finding of substitutes, but to suggest examples and possibilities of working up waste material, conserving and recovering the scarce, and the refining of crude materials to give more valuable products. All this is essentially short-range work.

Among the materials which are stated to have been recovered from industrial effluents in pre-war Germany are oils, fats, animal feeding stuffs and digestible albumen. Of course, the special circumstances of pre-war Germany must be taken into account and these methods might not be economic under presentday conditions, although they merit careful consideration. A pertinent point is that many of the salvage schemes in pre-war and war-time Germany and in war-time Britain were economic only because voluntary labour was used in its collection. This can not, of course, be made the basis of ordinary practice. The processes to be described show good possibilities of use on an ordinary industrial basis.

Treatment of discharge water from industrial processes often gives useful results. In all industrialised countries, stringent laws limit the amount of impurity permitted in effluents. In the effort to turn a necessary expense into a good investment, many industries have carried out or sponsored large chemical and biochemical investigations. The two main ways of turning legal necessity into financial virtues as far as water treatment is concerned, are to make the use of water cyclic or to recovery saleable by-products. In some particularly happy conditions both features may be present. Since industrial water represents an appreciable expense, the re-use of waste water is a valuable chemical salvage activity.

[illegible] in this work in Britain is the Water Pollution Research Laboratory which has developed several such processes. What has been described as the most spectacular example of re-use of liquors is the system developed for the best sugar industry. Process water from the screens and presses of a sugar factory contain plant materials and particles of soil in suspension, as well as sugar and other constituents in solution.

RE-USE OF PROCESS WATER

At British factories the process water is now re-used. The waste water is screened and passed through a small settling tank. It is then pumped back and mixed with a proportion of fresh water and the mixed water re-used. In factories at which screening is efficient the plant can be operated throughout a sugar "campaign" without discharging process water. In general the re-use of process water appears to have no adverse effect on the yield of saleable products.

Similarly, in the flax industry a cyclic process has been developed. In order to separate the fibres from the stem of the flax plant, the straw is first retted to loosen them, before mechanical treatment. Bundles of flax are submerged in water until eventually the softer tissues of the stems are attacked and partially decomposed by the activity of bacteria.

The previous process, developed on the Continent, was based on the use of anaerobic bacteria, yielding a mixture of foul-smelling waste waters with a pH between 4.5 and 5.5. Typical samples were about six times as strong as domestic sewage. An aerobic process was developed in Britain which gives a more manageable effluent and, while the latter is not sufficiently pure for discharge to a stream, it can be returned continuously to the retting tank wtihout seriously interfering with the process of retting.

At the end of a two to three-day ret with continuous aeration, liquor is returned by gravity from the settling tank for the next ret. From this process there is waste waters during the retting season. At th end of the season the liquor in the tank is disposed of by spraying it over as large an area of land as possible.

ELECTROLYTIC RECOVERY

Processes in which a by-product is recovered may or may not be cylic in character. In the pickling of metals, waste liquors may comprise spent pickle liquor and waste washing waters. Copper is usually pickled in sulphuric acid and the discharge of excessive amounts of the waste liquors from this process seriously inhibits biological activity applied in sewage purification. Fortunately, they are considered the easiest effluents to treat successfully. Electrolysis in the pickling vat itself, or in a central plant to which the liquor is pumped continuously, recovers the copper and regenerates the sulphuric acid. Applied with great success at a number of copper mills in Great Britain, it gives the further advantages of permitting a high and steady rate of pickling to be maintained.

From waste washing waters which contain a much lower concentration of copper and acid, the copper is recovered by passage through a bed of scrap iron yielding the copper as a metallic sludge.

Two wastes are combined to yield three useful by-products in one ingenious salvage operation used in a galvanising plant. The wastes are pickle liquor from steel cleaning and zinc skimmings from the galvanising tanks. Before it is fed as slurry to a main reactor tank the zinc is all converted to the oxide. Pickle liquor is freed from dirt, then brought into reaction with the zinc oxide (in the form of

slurry) and with chlorine gas. Ferrous sulphate, zinc sulphate and zinc chloride are all recovered.

SUCCESSFUL METAL RECOVERY

Ion exchange methods are recommended for use in waste treatment only where some relatively valuable material can be recovered for sale or re-use. There are successful examples of metal recovery, organic compounds recovery and removal of impurities by the use of ion exchange. Copper and chromium in the wash waters from pickling copper alloy can be concentrated more than 25-fold by taking them up on this type of material and subsequently regenerating. Many processes for the recovery of precious metals have also been described.

Nicotine has been recovered from the exhaust gases of cigarette tobacco driers by scrubbing the gases with water or dilute acid and passing this nicotine through a cation exchanger of the sulphonated coal type. The nicotine is obtained by treatment of the exchanger with ammoniacal alcohol. Ion exchange may also be applied by removing undesirable impurities from a solution which is later concentrated for recovery of valuable solids. It has been used for the demineralising of waste sugar solution, the effluent afterwards being concentrated to a syrup.

Quite recently in the U.S.A. industrial alcohol has been successfully produced from fruit cannery wastes, and it now appears possible that this is a practical solution of the growing waste-disposal problem of that industry. Pear waste, for instance, supplemented by the addition of small amounts of nitrogen in the form of ammonium sulphate, urea or ammonium carbonate, can be fermented continuously. In a 10-hour cycle it can produce 4.2 per cent alcohol by volume. This represents a 90 per cent efficiency in the conversion of sugar into alcohol. Apples which also require nitrogen fortification, ferment somewhat more slowly but produce a higher amount of alcohol.

In adapting industrial fermentation to cannery wastes the continuous alcoholic fermentation is carried out in a mobile unit. This gives many economies since a mobile unit is shared among canneries in different seasons. Such a unit consists of a complete distillery mounted in railway trucks with sufficient capacity to process the daily output of waste from the average cannery.

The most satisfactory continuous system is the two-fermenter one. This consists of two vessels connected in series. The first is filled with sterile medium and inoculated with yeast; then fermentation is allowed to proceed to a desired point. At this time continuous addition of fresh medium is started at a rate equal to the rate at which the yeast is growing and fermenting. At the same time the partially fermented material is continuously withdrawn from the first vessel and added to the second vessel in which fermentation is allowed to go to completion.

RECOVERING SULPHUR DIOXIDE

The first step in the smelting of both the lead and zinc ore concentration is the removal of sulphur as sulphur dioxide. Before the chemical plant was built, the gas, when released to the atmosphere was the source of much controversy and even litigation. Eventually, legal restrictions forced the company concerned to consider suitable processes for gas recovery. The aim, of course, then became not only to extract sulphur dioxide from the stack gases, but to obtain it in such a form that it could be sold, so that the recovery plants would be at least self-supporting.

The plan developed was to recover the sulphur as sulphuric acid and so utilise it

in fertiliser manufacture. This was done by organising ancillary manufacturing process, in order to turn out only saleable products. So, in addition to production of sulphuric acid from sulphur dioxide, the firm carries on synthesis of ammonia from nitrogen and hydrogen and the treatment of phosphate rock with sulphuric acid to produce phosphoric acid. With ammonia, phosphoric acid and sulphuric acid available, a balanced fertiliser production, programme becomes possible. Ammonia phosphate, ammonium sulphate and ammonium nitrate form the final products of the chemical side of this integrated plant.

Elsewhere uses have been developed for "fly ash", the residue from the burning of pulverised coal, which gets carried along long distances into the flues. Hitherto it has had to be dumped. Designers of the process hope both to solve the problem of utility undertakings in disposing of this waste and to provide abundant supplies of a cheap construction material. A mixture of limestone screenings, fly ash and a small amount of hydrated lime has been developed for use as a base course for supporting a concrete roadway and to replace the limestone screenings normally used as the base for bituminous concrete roadway.

Other fly ash applications include its use in insulating cements, building brick and in steel foundries to provide hot strength for core and moulding sand, as a replacement for silica flour. The British Electricity Authority recovers fly ash and is able to dispose of some to manufacturers of building materials, but only in amounts representing a small fraction of the quantity available. From certain flue dusts—notably those from coals of the Northumberland and Durham coalfields—the rare metals germanium and gallium are being extracted. No longer just a scientific curiosity, the former metal is being used in a new range of non-vacuum electronic valves as a crystal detector.

Some of our current British problems in using or up-grading wastes prove, on further inspection, to be in fact world problems. Some of them have proved very intractable, while for others solutions have been developed but not applied. Earlier reference was made to the world danger involved in the present rate of use of sulphur. Fortunately, there are some small signs of attention being paid to its recovery.

SULPHUR IN COAL

Sulphur occurs as the free element in deposits in Sicily and Louisiana. More widely dispersed, it is present combined with many metals in their ores and in various forms in coal. In Britain, the three million tons of sulphur present in the annual coal output represent toughly ten times as much as is actually used for sulphuric acid production in this country. Unrecovered, it represents not only a direct loss of material, but also an important indirect loss due to the corrosive havoc it wreaks on building materials and textiles. Yet at present only about 100,000 tons of the element are recovered, and this is mainly in the course of purification of coal gas.

This sulphur is used for sulphuric acid manufacture. At Fulham power station a flue gas washing process was installed which recovered sulphur in the form of calcium sulphate dihydrate sludge, which is identical with natural gypsum. However, the sludge was not marketable except occasionally in small quantities. Also, during the war, when the authorities asked for the creation of smoke in the London area, the process was suspended by official order and has not been reinstated.

A particularly ingenious process, which was operated before the war at a Manchester gas work, combined sulphur recovery from flue gases with ammonium sulphate manufacture. Calcium sulphate is prepared by a chemical route similar to that used in the Fulham process. The combustion gases are treated with a chalk suspension forming calcium sulphite, which is then oxidised to the sulphate. The latter is circulated instead of water for washing the ammonia out of coal gas. In the presence of the CO_2 also present in coal gas, ammonium sulphate and calcium carbonate are formed. The former is recovered and the latter returned to the flue gas washer. Thus the process is cyclic and continuous.

It is clear that the processes exist which can be applied at any large coal consuming plant, such as power stations gas works, large factories and even large blocks of flats, but that they are scarcely being applied.

Another British problem is that of finding a use for rubber dust. When tyres are re-treated the old heavily loaded and aged rubber residues of the old tread are ground off. Finding an application for the resultant rubber dust has so far proved impossible. Equally intractable has been the problem of sawdust and chips. These have been considered and used for loading linoleum, for making synthetic board and (with special adaptation) for firing boilers. The Fuel Research Station (DSIR) has even published a pamphlet listing abstracts of all reported and suggested uses; but still the surplus piles up at the rate of many thousands of tons each year.

SAWMILL WASTE

However, there may be hope in a very recently announced Australian process. Chemical treatment of bark and sawdust mixtures of white cypress pine, Callitris glauca, has been effective in yielding a much more valuable product. The Australian workers report that, on treating this waste material with small quantities of para-formaldehyde at moderate temperatures and pressures, a new type of board was produced. Equal parts by weight of sawdust and ground bark were heated at 140°C., with 1 per cent of paraformaldehyde for three minutes at 180 p.s.i. The resultant board, similar in properties to many fibre boards, is considered so promising that the process is regarded as a possible solution to the problem of using Australian sawmill waste. Other commercial timber species have also given good results.

Paper mill sludge, also already referred to as a world problem, has proved equally difficult to deal with in Britain. The trouble, as old paper-making itself, arises from the fact that the waste consists of 80-85 per cent water. The solids are 31 per cent organic and the remainder inorganic. Modern plants do not yield this refuse, but the many old plants in the country continue to add to depressing acres-wide "lakes" of this sludge.

WAX FROM PEAT

At the Fuel Research Station attempts have been made to develop a practical process for extracting wax, by means of suitable solvents, from peat and lignite. This is strictly an up-grading process, since these materials are used at present only as low-grade fuels. Lignites occur in appreciable deposits only at Bovey Tracey (Devonshire), but there are, of course, peat moors in several parts of England and Scotland.

German lignites are reported to be yielding about 10 per cent of a crude ester wax using benzene or benzene alchol as solvents. Benzene extraction has also been successfully carried out on the British

lignite, giving a yield of 4.4 per cent on the semi-technical scale. A very similar wax has been obtained from peat, except that the melting point is a little difficulty, but the prospect of successful competition with imported waxes is very uncertain.

Another interesting salvage possibility which has been proposed is that of recovering methane gas by anaerobic digestion alcohol distillery effluent liquors. It has been claimed that by this process these effluents could be made to furnish the entire fuel requirements of stills of the vacuum type or two-thirds of the steam requirements of an ordinary two-column still.

In the sphere of extracting valuable materials from natural resources, as distinct from industrial waste, great strides have been made in seaweed research. Lord Bilsland, Chairman of th the Scottish Council (Development and Industry), however, recently expressed the fear that others might be quicker than the Scots in taking advantage of this research, and this despite Britain's five years' start on every other country. Accurate figures are not available, but the output of the British alginate and algae producing firms is estimated to be worth about £700,00 per year. There is available each year no less than one million tons of suitable dry seaweed from the coasts of Scotland.

In considering the long-term aspect, one author has suggested that all processes be assessed from the standpoint of conservation, and not only as a matter of money economics. He proposes an index called the "conservation quotient," abbreviated to cq and defined by this simple equation:—

$$cq = \frac{\text{weight of replaceable or inexhaustible material}}{\text{total weight of materials inexhaustible in the manufacture}}$$

It will be seen that he has included "inexhaustible" material, which evidently is meant to cover such gases as oxygen from air or salts from sea water, where for all practical purposes the sources really are inexhaustible. If this came to be applied, all suggested processes would be considered not only from the standpoint of money economics, but also of the effect on world resources. Thus, the conservation quotient of electricity made in a coal-burning power station is zero. Only irreplaceable coal has gone into its manufacture. On the other hand, the cq of electricity generated by a waterfall would be nearly one. It would be less than one only by the amount representing the wear on the equipment—the depreciation allowance, as it were.

Furthermore, increasing interest is being shown by a number of workers who are thinking of conservation, or even creation of resources, in the remarkable synthetic activity of micro-organisms. For instance, a 1000 lb bullock has been estimated to produce one pound of protein in 24 hours. A similar weight of soyabean seed yields 86 lb. and Torulopsis yeast gives abtut 4000 lb. Similarly, the marine algae, such as the non-buoyant seaweed typified by the Laminaria, can produce carbohydrate (by photo-synthesis) at twice the weight per acre of the average forest.

—TESTING PRECIOUS METALS

IN jewellery works many types of precious metals and their alloys are used. It is very difficult to distinguish them and determine thier value. The old method of rubbing over touchstone, which still holds, gives a rough idea about the value of the alloys but difficulties arise in many new types of alloys which find their way in modern jewelleries. The present article will give a fair idea of distinguishing the precious metals and their alloys and estimating their value in a scientific manner.

The principle is the same, whether the jeweller applies the test acid direct to the article or, in the old-fashioned way applies it to the streak of gold left on the touchstone; he seeks to obtain an indication of base metal, and particularly the degree of copper present, by the amount of greenish effervescence.

PREPARING SURFACE FOR TEST

Perhaps hardly necessary to say that all lacquer varnish, etc. must first be removed from the surface of the article to be tested, using alcohol or ether. The second point is that the surface, though gold, may be only gilt or rolled gold, in which case some spot must be found, least damaging to the article, where a file can be applied to get through to the main metal.

TESTING WITH ACIDS

Two testing acids come into use: (1) Nitric acid diluted; (2) Aqua regia, which is nitric acid again, but with hydrochloric acid added. The best plan is to have four bottles; one pair for nitric acid, concentrated and dilute, and another pair for two strengths of aqua regia.

Nitric acid for testing of an article is made of gold is prepared by taking 2 oz. of water and adding thereto 2 oz. nitric acid, a few drops at a time. Never do it the reverse way, water into acid, as spurting up of the liquid will occur. Mix and keep in glass stoppered bottle with long dropper, by which a drop of acid is applied to the surface of article. Test acids need renewing from time to time, as if weak the indications may be deceptive.

TESTS FOR GOLD

Nitric acid produces little effective on 9-carat gold and none on gold over 9-carat, but bubbles greenish on alloys with less gold than this, or on gold plated articles. The more active the acid, the baser the metal. The principle at work here is that pure gold is insoluble in nitric acid, but any copper or silver present is dissolved. On this rests the efficacy of the method, for the more copper and silver an alloy contains the quicker it breaks up into solution under action of the acid.

A pinkish — Cream reaction means gold plated on silver.

Aqua regia is required if the gold article is made of the higher carats over 9, as nitric acid alone is not effective and it needs the addition of hydrochloric acid in the proportion of hydrochloric 2 oz.; nitric acid 1 oz. The proportions 3:1 are sometimes recommended. This is called aqua regia, and should not be kept too long, as it gets stale. If hydrochloric acid is not available and the touchstone is being used, sprinkle a little common salt on after the nitric acid has been applied to the stone.

Gold of 18-carat remains untouched, but lesser alloys become paler or disappear altogether.

USING THE TOUCHSTONE

The smooth piece of hard siliceous stone (stained black), known, as the

touchstone, has been a useful accessory to jeweller's shops for generations. Over its surface is passed with firm, even pressure an edge of the article to be tested, leaving on the stone a streak of metal. Parallel with it is made a second streak from a "needle" of known carat alloy. To these two streaks is applied the test acid, and by the resultant effect comparing what the acid does to the unknown metal with what it does to the streak of known carat alloy, one judges the approximate caratage of the article. The testing points used for the comparative streak can be mounted in star fashion, giving five different standard golds.

As before use nitric acid if you think the article is 9-carat or under, and aqua-regia if over. Try a higher carat needle if on the first test it is the needle streak that reacts the quicker. The touchstone offers no automatic test, as it still requires experience to interpret the effect seen upon it. It should be cleaned occasionally with nitric acid, rubbing the surface with a ball of paper or flat pumice stone. The surface should feel velvety.

ROLLED GOLD TESTS

The buyer in a big firm may at times want to examine closely into the merits of of rolled gold jewellery from two different makers. A weak solution of nitric acid and water is prepared, say twice as much water as acid, and the samples are suspended from a pencil or small rod across the top of a glass tumbler, letting half the object be immersed in the solution. If the acid acts vigorously from the beginning, the acid is too strong and needs dilution, as the thin front of gold needs gentle handling. After the base metal has been eaten away it should be possible with good quality rolled gold to measure with a micrometer the thickness of the gold shell left.

TESTING PLATINUM

This metal resists the strongest nitric acid, so that any streak of it on the touchstone remains where many other metals disappear. But not all, for stainless steel and 18-carat wihte gold are equally without reaction. A platinum standard reference needle of 950/1000 purity will give a streak for comparison.

To eliminate these other resistant metals, therefore, as possibilities, recourse is had to aqua regia. The following table sets out the effects in very clear form for distinguishing between platinum, white gold, palladium, dental alloy, stainless steel and nickel.

Before carrying out these tests clean the surface of the metal; apply a drop of nitric acid, full strength, to the cleaned part. This will reveal 14 and 9-carat white gold, palladium, dental alloy and nickel. If there is no action apply a few drops of aqua regia (3 parts HCl to 1 part HNO_3). In both cases heat the acid before application and apply with a glass rod. Allow the acid to remain in contact with the metal for about half a minute. Mop up the acid with a clean white blotting paper or filter paper and wash all traces of acid from the metal. Compare the metal and paper with the table.

Metal	Nitric Acid effect on metal.	Aqua Regia effect on	
		Metal	Blotting Paper
Platinum	No action	Slight etching No discoloration	No stain.
18-ct White gold	No action	Attacks readily Dark stain	Bright Yellow stain.
18-ct White gold containing palladium	No action	Attacks readily no discoloration	Light brown stain (see note).
14-ct White gold	Attacks slowly Brown stain	Attacks readily Brown stain	Green stain.

Metal	Nitric Acid effect on metal.	Aqua Regia effect on Metal	Aqua Regia effect on Blotting Paper
9-ct. White gold	Attacks readily Brown stain	Arracks readily Brown stain	Green stain with yellow tinge.
Palladium	Attacks readily slight etching No discoloration	Attacks readily no discoloration	Darkish brown stain
Dental alloy	Black stain. The addition of a drop of brine gives a white precipitate	Rapid action black stain.	No stain.
Stainless steel	No action	Attacks readily no discoloration	Yellowish brown stain (see note).
Nickel	Attacks readily No discoloration. (Blue-green stain on blotting paper)	Attacks readily no discoloration	Faint green stain.

Note:—The tests for white gold containing palladium and stainless steel give some what similar results. In case of doubt the following additional test can be made.

Apply a drop of aqua regia to the metal (this will give a yellow solution). Add 1 or 2 drops of stannous chloride. If the metal is white gold a black precipitate will be found. If stainless steel the yellow solution will become bleached.

The stannous chloride solution is composed of 1 part stannous chloride dissolved in 5 parts of water and 5 parts of hydrochloric acid.

TESTS FOR SILVER

A suitable part of the article being filed, the spot is touched with a solution of nitric acid. If the article is silver, the spot turns greyishcream, but if silver below sterling quality the spot is darker and greenish. A plated coating having been cut through with the file, the base metal effervesces greenish. Silver of known quality can be touched with acid for comparison of effect.

The more modern way is to use silver nitrate in 30 c.c. distilled water, adding a drop of nitric acid. Applied to sterling silver there is no effect, but if a brownish stain is seen, the darker it is, the more base metal present.

By using a sequence of nitric acid and hydrochloric acid, both undiluted, the effects on the touchstone are as follows: The article having left its mark on the stone, nitric acid is applied. The line of metal disappears, but after addition of drop or two of hydrochloric acid a whitish deposit (silver chloride) is seen. By comparison with streaks from test needles of known silver quality, which give a similar, deposit, some idea of the nature of the silver alloy can be gained. Non-silver metals turn black or dark brown as a rule.

To test between silver and non-silver articles, use can be made of the "lunar caustic pencil" (Silver nitrate). If the cleaned sufrace of the white metal article is moistened and the point of the pencil is rubbed thereon the mark may turn black, in which case the metal is definitely not silver. If it remained unchanged, the decision is, unfortunately, not position that the metal must necessarily be silver, as certain other white metals (i.e. chromium plated goods) cause no darkening. This test is therefore only positive when the black mark appears, and indicates non-silver metal.

Another test is that of oxidation or tarnishing, which is very useful in locating a soldered seam. The article is gently heated, thus producing an oxide film, which becomes darker as the copper content increases. The same test may be applied to gold seams.

Tamarind Seed Kernel as a Sizing Material in the Jute Industry

STARCHES and flours are used in large quantities for sizing cotton and jute yarns and in the filling of cotton abrics. The main function of sizing in ie case of yarns is to apply a protective oating and to enable them to better with-tand the stresses, strains and abrasive ctions which take place on looms during ie weaving; the application of size to ibrics is alone mainly with the object of dding weight to low quality materials nd for imparting certain properties such s stickiness.

The possibilities of tamarind seed as source of commercial pectin and to its tilization as a sizing material for cotton arns had been drawn by Messrs Ghose nd Krishna in the year 1942-43. They lso described the reaction product by orax with tamarind seed pectin which in be utilized as a substitute for gum agacanth. The following account by essrs W. G. Macmillan & I. B. Chakra-irti of the Indian Jute Mills Association esearch Institute Calcutta which ppeared in a recent issue of e JOURNAL OF SCIENTIFIC & INDUSTRIAL ESEARCH, will show the ways and means utilizing the seed as a sizing material jute industry. Preparation of Tama-nd seed consists of a dark reddish brown iter husk or testa, and an inner cream-loured kernel. In the preparation marind kernel flour it is essential to ect as complete a removal as possible the testa from the kernel. Several tents have been taken out on the pre-ration of the flour from the seed. In first process the seeds are first parch-heated, or gently roasted in order to der the outer testa friable and thus ilitate its removal; the testa is then removed by a decorticating process and separated from the kernel by winnowing or other convenient means. The decorticated kernels are either steeped or washed to remove water-soluble sugars, tannins, etc. and dried prior to grinding into flour. In commercial quality tamarind seed kernel flours, the washing operation can be dispensed with, without any material effect on the suitability of the product for jute sizing: by doing so, the process is cheapened and the yield increased.

In a second method the seeds are crushed in a swing-hammer type of disintegrator, when the testa, which is more brittle than the cotyledons, is broken and removed from the latter in a finer state of subdivision. The cotyledons are separated from the testa and further ground to the requisite fineness. The first process yields a product of comparatively low testa content. The second process has, however, the advantage of lower cost of production since the operations for manufacture of T. K. powder are more mechanized in it. It seems possible to design a continuous and entirely mechanized plant by a combination of the principles of the two processes for improving the quality of the flour and for decreasing the production costs.

The seed is first parched in a roaster at a definite temperature for a definite period and is then fed into a grain cleaner provided with beaters and an exhaust fan. The dirt and husk are separated here and the decorticated seed is then ground in two stages. In the first stage, the seed is crushed in an impact grinder, final pulverizing being done in a stone grinder.

The tailing from the stone grinder is used repeatedly till it is of the requisite fineness.

A typical processing figure is given below:—

	%
Loss due to roasting	15.16
Husk	33.10
T. K. powder	51.47

TESTING OF QUALITY OF T. K. POWDER AS A SIZING MATERIAL

In most commercial preparations of T. K. powder, natural colouring matters and tannins are present, which come from the adhering testa in the kernel. When boiled with water, these substances impart a pink colouration to the paste; further the reaction of tannins with the iron parts of the sizing machinery produces a blue colouration, the depth of which varies with the testa content of the flour. Yarns sized with T. K. powder of high testa content are sometimes discoloured to such an extent as to give rise to serious complaints. The testa also forms insoluble gelatinous lumps on boiling with water and these can block the pipe lines in the sizing system. It is, therefore, essential that the testa content in the powder should be reduced to a minimum.

Apart from the deleterious effects of the testa in T. K. powder, that latter is sometimes adulterated with deteriorated starches and flours, china clay, wood flour, etc. Although deteriorated starches or flours are not necessarily harmful for sizing purposes, provided certain precautions are taken, the pastes made from them are less viscous than those made with an equal concentration of T. K. powder and, as such, the quantity of T. K. powder (containing the starches or flours) in the size vat has to be increased, which adds to the cost. On the other hand, substances such as china clay or wood flour are cheap adulterants which increase the bulk of the powder at the expense of the adhesive quality of the paste and also increase sedimentation in the starch boxes: hence they must be avoided.

Since the introduction of T. K. powder as a sizing medium for jute yarns, the necessity for testing each consignment of the flour delivered to the mills has been emphasized and routine methods of analysis and control have been introduced. As a result of experience grained, certain specifications as regards the quality of the powder have been put forward. The system of quality control has resulted in a progressive reduction of inferior and adulterated grades of T. K. powder, has enabled mills to reject inferior consignments, and has saved individual mills large sums of money in their purchases.

In ascertaining the quality of T. K. powder, the following routine tests should be carried out:

General examination of the powder regarding colour, odour, granule fineness and the presence or absence of insect attack.

Microscopical examination of the powder with special attention to the presence or absence of extraneous matters and adulterants.

Examination of paste characteristics includes the colour of the cooked paste in the presence and absence of alkalies, viscosity, sedimentation tendency, adhesive property and stability.

Chemical Examination—Determination of moisture, ash, polysaccharide and albuminoid contents. Reaction with iodine and iron should also be examined.

Biochemical examination includes the susceptibility of the paste to microbial growth and the action of antiseptics in retarding or suppressing such growth.

The above indicate the tests involved in a complete examination of the powder. For a routine analysis, however, the number of tests can be cut down considerably and a suitable procedure is described below:—

RAW FLOUR

Colour—This should be light cream to light yellow.

Odour—No disagreeable smell should be detectable. Musty or rancid odour or profuse insect growth shows incipient decomposition.

Fineness—85 to 90 per cent of the powder should pass through a 50-mesh sieve and the residue should be free from large lumps. The fineness of the granules regulates the time and extent of gelatinization of the T. K. powder.

Adulterants—A drop of the powder suspension in water when examined under a microscope at magnifications of x80 and x400, should not reveal the presence of adulterants such as deteriorated starches, flours or china clay.

Ash content should not exceed 3 per cent.

Moisture content should not exceed 10 per cent.

Albuminoid content should not exceed 20 per cent, although generally this figure is below 17 per cent.

T. K. PASTE

A standard paste is prepared as follows:—

2.2 gm. of T. K. powder (moisture content 10 per cent) is made into a creamy paste with a small quantity of water, avoiding the formation of lumps and clots; 0.4 c.c. of 5 per cent sodium carbonate is then added followed by 200 c.c. water. The slurry is heated in boiling water for 2½ hr. with stirring. The paste is cooled, strained through a fine muslin, and the volume made up to 200 c.c. The following tests are then carried out on this 1 per cent paste:

Visual Examination—The paste should be light grey to light pinkish grey; a higher intensity of colour can be allowed if the reaction of iron with the paste, described below, does not produce a dark blue colour.

Viscosity—This is measured in a No. 1 Redwood viscometer at 80°F and the paste is classified into three groups according to its consistency.

Below 40 Redwood sec.—poor quality; incipient decomposition or adulteration is to be suspected.

Between 40 and 50 Redwood sec.—medium quality.

Above 50 Redwood sec.—good quality.

Sedimentation Tendency—The paste should not quickly form sediments on standing. The insoluble matter present in the paste tends to form a sediment and it will be more noticeable in an imperfectly gelatinized paste. T. K. powder forms lumps and clots unless it is slowly and evenly mixed with water. The sediment, and the lumps and clots, if formed, will gradually accumulate in the size vat, sow box, and also in the pipe lines which feed the paste to the sow box and may eventually choke the feed lines. Further unless properly and periodically cleaned, aerobic and anaerobic microbial decomposition of the sediment may take place in these places when the vat is not in use and contaminate the subsequent batches of size paste.

Stability—The paste without an antiseptic should not decompose within 24 hr.

Owing to the high albuminoid content of T. K. powder a paste made from it is liable to liquefy quickly due to the action of micro-organisms. The decomposed product emits a foul odour and the sizing value of the paste is considerably reduced. The addition of a suitable antiseptic such as salicylic acid, B-naphthol or pentachlorophenol is advisable particularly during the week-ends. The susceptibility of diffe-

rent grades of T. K. powder to microbial attack and the potency of different antiseptics in inhibiting microbial growth will be dealt with in a subsesuent communication.

Reaction with Iron Filings—A 1.5 per cent paste is made without alkali addition and 10 to 15 c.c. of the paste is taken in a test-tube with approximately 1.5 gm. of iron filings. The mixture is maintaned in a water bath for half an hour and a deep blue or blue-black colour indicates the presence of excessive quantities of testa in the flour.

Reaction with Iodine—A 1.5 per cent paste, acidified with sulphuric acid, should not give a blue colour (test for starch).

Polysaccharide Content—The precipitate obtained by adding two volumes of alcohol to one volume of paste should not be less than 40 per cent of the weight of the powder when due allowances are made for the albuminoid content in the alcoholic precipitate.

The specifications laid down by Rao and Krishna, which relate to tamarind kernel flour intended for use in the cotton textile industry, are also useful and these consist of testing for colour, presence of testa, coarseness of the powder and percentage of "pectin". In their opinion, the powder should be 100-mesh fine, the ash content should not exceed 3 per cent, the colour of the powder should not exceed 0.3 red and 0.5 yellow in a Lovibond tintometer, no colour should be extracted with 90 per cent alcohol, the "pectin" content should not be less than 50 per cent, the xylosan content between 19 and 21 per cent and the viscosity of a 4 per cent solution of T. K. flour should be the same as 5 per cent maize starch.

PREPARATION OF T. K. PASTE FOR SIZING OF JUTE

The preparation of a sizing paste from T. K. flour is straightforward and the conventional sizing equipment can be used for this purpose. The following formula and method of preparation have been recommended and are extensively used in the jute industry:

T. K. powder	15 to 20	lb.
Soda ash	8	oz.
Salicylic acid or Beta-naphthol	4	"
Shirlan	1	"
Water	100	gal.

40 to 50 gal. of cold water are run into the mixing tank, the stirrers started and requisite amount of soda ash dissolved in it. The flour is slowly added by passing through a fine sieve (20 to 40 mesh) to prevent lumping, steam is turned on, the mixture brought to the boil, and boiling continued for a further 15 to 20 min. The final volume is adjusted to 100 gal., the antiseptics added, and boiling continued for another 5 min. when the paste is ready for use.

The formula given above is simple and only soda ash and common antiseptics like salicylic acid, B-naphthol and shirlan have been used: sizing auxiliaries can be incorporated for special purposes. The slight alkalinity of the paste stabilizes the paste viscosity and the antiseptics preserve the paste from microbial attack when it has to be stored overnight or during the week-end.

BLEACHING OF T. K. POWDER SIZE PASTE

When adequate attention is paid to the manufacture of T. K. powder and the testa content is kept down to a reasonably low figure, the paste made from the powder does not stain the sized yarn. Experiments with testafree samples of of added testa have shown that when the T. K. powder containing known amounts testa content in the powder is below 1 per cent, no perceptible darkening of the paste colour takes place, either with the addition

[illegible] by reaction with iron. With a testa content between 1 and 5 per cent, the paste, although giving the colour reactions, has no deleterious effect on the yarn. No bleaching treatment of the T. K. powder is, therefore, ordinarily called for, provided the testa content is kept below this figure. A majority of the commercial samples of T. K. powder tested in these laboratories conforms to this standard. It has, however, been observed from time to time that some samples, although quite suitable as regards other specifications, have to be rejected owing to their higher-testa content.

Attention was directed to finding suitable conditions for bleaching the flour at different stages of processing of the seeds. It was, however, realized that such a treatment, if generally applied, will involve a wet processing of the powder, e.g. bleaching, washing and drying; consequently, the production cost will be appreciably increased. For jute this is not justified since it is a brownish coloured fibre and there is little to gain by making the paste white, excepting in special cases such as bleached jute yarns. Attempts were made to bleach the paste made from T. K. powder containing high proportions of testa, prior to its application to the yarn. Although some success has been attained in this respect, it has not yet been possible to find a suitable treatment that will improve the paste colour without affecting other physical properties of the paste such as viscosity and adhesiveness. For example, oxidizing agents such as bleaching powder, sodium hypochlorite, sodium perborate, hydrogen peroxide or potassium permanganate, under suitable conditions bleach the paste to varying degrees but at the same time effect a rapid thinning down of the paste. Moreover, the darkening of the paste with iron is little affected although the final shade obtained is frequently dark-red or black instead of dark blue. Reducing agents such as sodium sulphite, bisulphite or hydrosulphite, on the other hand, do not alter the paste consistency appreciably under neutral or slightly alkaline conditions, but the improvement in the colour, excepting with high concentrations of hydrosulphite, is not marked. Under acidic conditions, however, the bleaching effect is quite pronounced, but the relatively large amounts of chemicals necessary, the lowering of the paste consistency and the possible adverse effect of acids on the sized yarn and the machinery limit the use of these substances from the practical standpoint. Acids themselves without any bleaching agents and also some acidic salts make the paste colour lighter and, further, the reaction of the paste with iron is inhibited to a considerable extent, but the objection given above against the use of these still holds good. A more encouraging result was obtained with alum which is sometimes used in textile processing, and which has also a limited application as an antiseptic. It has been observed that when the amount of alum is kept within 1 lb./100 gal. of the paste, the decrease in viscosity is comparatively small and, at the same time, the colour of the paste improves. Alum can, therefore, be used for improving the colour of T.K. powder of high testa content, provided the paste viscosity is also high. It is important to note that when alum is used it should be added at the end of boiling so that the time of reaction with the paste is kept at a minimum.

DESIZING OF JUTES: ESTIMATION OF T. K. POWDER IN JUTE YARNS

Yarns sized with starches are desized by diastic enzymes. T. K. flour is claimed to react in a similar manner with malt diastase, but the desizing is only partial, since hydrolysis of the flour paste by the

... does not proceed to completion. The method given below is based on the finding that about 85 per cent. of the flour can be extracted from jute yarns with boiling water. A sample of unsized yarn for use as a control is required along with the sample of sized yarn.

Determination of the Percentage of Water-extractable Matter in Unsized Jute Yarn — Weigh accurately about 5 gm. of bone-dry yarn and boil with 750 c.c. distilled water for 2 hr., changing the water after an hour's interval. Dry to constant weight at 110°C. and the difference in the two weights represents the soluble matters (a) in unsized jute after 2-hr. boiling.

Boil the sized yarn under identical conditions and determine these percentage of water-soluble matter (b).

The percentage of T. S. size on jute is obtained from the formula (b-a) × 1.18.

—MANUFACTURE OF CATECHU

FROM very ancient times Khair is prepared in India from a species of tree, which grows in abundance in most deciduous forests of India and Burma. It is used in chewing betels, in medicine, in dyeing fabrics and in other industries.

There are three forms of catechu trees and each has distinct characteristics and the areas of their distribution are different. The khair forests of Bengal are of somewhat different character from those of the United Provinces. The former grows in regions of heavier and better distributed rainfall and forms almost pure crops of tall clean-boled trees with closed canopy, occurring generally in tracts of alluvium. In the United Provinces the trees grow on recent alluvium, but there are many khair trees on the older and higher deposits, sometimes pure but very often mixed with sissoo and other species. In the United Provinces in the khair tree areas, a considerable number of the trees are stunted or stagheaded. They have massive crowns very often damaged by lopping and their stems are generally crooked and sometimes forked.

Cutch and katha are important commercial product obtained from the heartwood of Acacia catechu. In Madras, cutch is prepared from the heartwood of Acacia Sundra, which replaces Acacia catechu in South India.

Cutch is extensively employed for dyeing canvas for boat sails, a reddish-brown colour, and for dyeing and preserving fishing nets and ropes. Fishing nets treated with cutch are not effected by salt water. The other product katha is consumed with pan throughout India. It is not exported, but the Indian demand for this commodity is enormous.

PREPARATION OF CUTCH

The preparation of cutch is carried out in different ways in different localities, though the main essentials are the same. The process is essentially one of extraction rather than distillation, in that the chips of wood are boiled up in water and are not treated with steam. The most generally used country procedure for making cutch is as follows:—

The heartwood, preferably that showing white spicks of kheersal, is cut into chips which are boiled with water in earthen pots for about 12 hours. The time for which the chips are boiled depends upon their size; the smaller the chips the less the time for which they need to be boiled and the greater the outturn of cutch. Sometimes the liquid is poured into other pots in which liquid of a thicker consistency is boiling, and this process is continued until the liquid is of the correct consistency. Finally it is poured into an iron couldron and further boiled and stirred, until it attains the consistency of syrup, when it is poured out into wooden frames lined with leaves and allowed to cool. It then hardens into a dark brown, solid brick-like mass, in which form it is marketed.

The outturn of cutch depends upon a given quantity of heartwood and the efficiency of the extraction.

PREPARATION OF KATHA

Katha is prepared in the first stages in the same way as cutch, but the reboiled liquid is poured into moulds dug in fine sand which absorbs the tannic acid and leaves a residue of catechu to crystallise out into the Katha of Commerce.

Katha is therefore, similar to cutch but with most of the tannic acid removed.

[illegible]

The above country methods of manufacturing both cutch and katha are found to be wasteful, because when making cutch it is most possible to recover the catechin or katha, while in the manufacturing of katha, catechu tannic acid (cutch) is allowed to go to waste in the sand in which the katha is collected. As the result of experiments at the Forest Research Institute, Dehra Dun it has been found possible to extract cutch and katha at one and the same time, by a slight modification of the above methods. The procedure adopted in the Forest Research Institute is as follows:—

The heartwood is chipped with axes in the ordinary manner and the chips are then placed in a vessel in which they are boiled with water over an open fire; the time for which they are boiled depending on their size. This operation is best carried out in a tinned copper vessel. On no account should iron vessel be used, as the catechu-tannic acid (cutch) forms a greenish-brown compound with ferric salts, which impairs the colour of the cutch and katha.

After boiling, the liquid is poured into another vessel in which the concentration is carried out, and into which it is strained through a piece of muslin to remove all traces of chips, sand, and other impurities. The liquid must be strained while still hot, or there is danger of the catechu (Katha) crystallising out on the cloth and so being lost. In the meantime fresh water is added to the chips, which are again boiled. In some cases as many as 5 boilings are made but three should prove sufficient if the chips are small.

The liquid obtained by straining is now concentrated over a fire till the required density is obtained. In cold weather it is best to concentrate the liquid till it attains a density of 1.07 to 1.08, but in hot weather it will prove better to concentrate the liquid still further. The optimum concentration can be ascertained by experiments, but in no case should the liquid be concentrated to a high degree as the catechu-tannic acid retards the crystillization of the catechin in thick solutions. The density of the liquid is easily ascertained by means of a hydrometer.

As soon as the desired concentration has been attained, the liquid should be set aside to cool slowly and to stand for several days. In cases where the temperature is high it would be advisable to reduce the temperature of the solution further, after it has reached atmospheric temperature. This can be done by immersing the vessel containing the liquid in cold water. As soon as the liquid has cooled sufficiently, it should be "Seeded" with some crystals of catechin (Katha) as this accelerates the formation of katha.

Catechin is soluble in hot water but very sparingly so in cold, while catechu-tannic acid is soluble in both hot and cold water. This fact is taken advantage of to separate the catechin from the catachu-tannic acid and hence the necessity for allowing the liquid to become quite cold so that the catechin can crystallise out.

After the liquid is allowed to stand for some days, it will be found that on the bottom of the vessel there is a mass crystals of catechin (Katha).

It is now necessary to separate these crystals from the mother liquid, which consists of catechu-tannic acid and a small amount of catechin which has not crystallized out. This is best done by straining the liquor through fine muslin. It will probably be found that when the liquor is first poured into the muslin, some catechin crystals will pass through the filtering material but as a bed of crystals

forms on the muslin, this will cease and only catechu-tannic acid will pass through having the catechin on the cloth. The cloth should be distrubed as little as possible while filtration is in progress so that the bed which forms is not broken.

The catechin adhering to the cloth after filtration may then be washed with some cold distilled water to remove all traces of catechu-tannic acid. It should be scraped from the cloth and dried between sheets of cotton covered top and bottom with sand. As soon as it has partially dried it can be cut into cubes or other suitable size for the market, and further dried and stored in racks with a free circulation of air till ready to be packed for despatch.

The mother (catechu-tannic acid or cutch) can be again concentrated after the extraction of catechu till attains a specific gravity of about 1.1, when it is allowed to cool again and deposit a further crop of catechin, which can be removed as before.

The final mother liquor thus obtained will be practically devoid of catechin and can then be concentrated and made into cutch in the ordinary way.

The amount of catechin which can be obtained from a given quantity of wood depends on the catechin content of the wood and the care taken in preparation. All unnecessary heat should be avoided as this tends to oxidise the catechu, forming catechu-tannic acid.

The quality of the cutch and katha obtained from a given quantity of wood show a great improvement over those obtained by the old country processes, and it is probable that they will gradually oust the old country methods altogether, especially as the demand for katha is steadily on the increase.

—Desiccated Cocconut and Its Products

DESICCATED coconut is widely used *in confectionery, especially the sweet and chocolate-making trades, also in domestic cookery* for such articles as cakes, puddings, macaroons, and curries. It is also known as D.C.N., "farine de coco" or "coco rape."

Desiccated coconut is made only from good quality fresh nuts, in factories situated near the plantations and a good water supply. After the husk has been removed the shell is deftly chipped off by means of a small hatchet of with the aid of a circular saw. The thin brown rind on the kernel is then pared off with an implement similar to a spokeshave, in much the same way as peeling a potato. By means of revolving rasp the kernels may be further cleaned to remove any pieces of rind that still adhere. If left they would result in brown flecks in the finished product. After being freed of milk and thoroughly washed the meals are put through the cutting or shredding machines. These vary according to the type of product required, whether the ordinary granular desiccated coconut, chips, shreds, tapes, etc. The product is then dried or desiccated by being spread out on galvanized sieves in hot-air dryers. This extracts nearly all the moisture and destroys the ferments which cause rancidity.

After being allowed to cool the new crisp snow-white product is packed in lead-lined plywood chests holding about 130 lbs. for the market. The granular desiccated coconut is sifted into three grades, coarse, medium, and fine, before being packed. The finest is sometimes called "macaroon." These different grades all have their special uses in the confectionery trades.

In the manufacture of good quality desiccated coconut the various processes are carried out with as little delay as possible and with great care as to cleanliness. This is essential if a product with all the flavour and fine aroma of the fresh coconut is to be obtained. Three average sized nuts are required to produce one pound of desiccated coconut.

As a food, desiccated coconut is of high nutritive value and readily acceptable to most palates. In view of the comparatively low price at which it is generally sold it is strange that it has not come into more general use in the homes of Europeans and Americans. A few good recipes for its use are now given below:—

Desiccated Coconut (Soaked in milk)	2	cups.
Eggs	2	,,
Sugar	1	cup.
Milk	½	,,
Flour	2	cups.
Butter	2	tablespoons.
Sodibicarb	½	spoonful.
Cream of tarter	1	teaspoonful.

Mix and put in tin moulds. Then bake in a muffle or bakery oven.

COCONUT BREAD PUDDING

Soak ½ cup desiccated coconut in boiling milk for ½ hour or more, then add it to the usual bread-pudding preparation. This will be found very pleasant and economical.

COCONUT PUFFS

Mix 2 cups desiccated coconut with 1 cup powdered sugar; the beaten whites of 2 eggs and 2 tablespoonfuls flour; drop on buttered tins and bake quickly.

COCONUT MACAROONS

Take ½ pound desiccated coconut, ½ pound finely-sifted sugar, and the whites

of 4 eggs beaten to a firm froth; mix well. Drop balls of paste upon a well-buttered tin and bake in a moderate oven for about 20 minutes.

COCONUT CONES

Mix equal parts of fine desiccated coconut and corn flour with sufficient water to make into a stiff paste. Mould into tin cones and bake.

COCONUT PIE

One cup desiccated coconut soaked in milk, 3 eggs, 2 tablespoon corn flour; a little butter and salt and sugar if wanted, also grated rind of lemon. Bake without upper crust.

COCONUT PUDDING

Beat 3 ounces butter (or butter substitute) with 1 cupful sugar or ¾ cup golden syrup or molasses and add 1 egg well beaten. To this add 3 cups fine wholemeal flour, 2 ounces desiccated coconut, and 1 cupful milk. Mix well. Steam for 2 hours or bake slowly for 1 hour in a flat dish.

DATE AND COCONUT BALLS

To a cup of mashed or minced dates (stoned) add ½ cup desiccated coconut and 1 cup other grated nuts. Moisten with syrup or thin honey and mould into balls.

DATE COCONUT SANDWICH FILLINGS

Equal parts of mashed dates and desiccated coconut mixed together are a good sandwich filling.

MUTTON CURRY

Half pound cut into small pieces (prawns, fish, chicken, or liver may also be used); 1 teaspoon curry powder; 2 2teaspoons salt; 4 teaspoons onions cut fine; 1 teaspoon butter; ½ pound fine desiccated coconut. Add the curry powder and the salt to the mutton and stir well. Pour ¼ pint boiling water on the desiccated coconut and let it soak for 5 minutes. Then squeeze out milk, preferably with the hand, and pass the milk through a strainer. Fry the onion (in a saucepan) with the butter until brown. Add the mutton and fry for 10 minutes over a slow fire. Then add the coconut milk, cover the saucepan and boil over a slow fire for 20 minutes. Remove as soon as a thick gravy is formed and add 1 teaspoon fresh lemon juice.

CABBAGE MALUNG

Boil 5 ounces shredded cabbage, ½ tablespoon chopped onions; a little chilli or red pepper; 2 teaspoons salt with ½ cup water until the water has nearly evaporated. Then add 2 desertspoons fine desiccated coconut and stir well for about 5 minutes, until water evaporated.

The above recipes have been recommended by Ceylon Coconut Board, Colombo.

—PHARMACEUTICAL RECIPES

SYRUP CALCIUM LACTOPHOSPHATE (B.P.)

Calcium lactate	75	grains.
Concentrated Phosphoric acid	45	millilitres.
Orange-flower water	25	„
Refined sugar	700	grains.

Distilled water, sufficient to produce 1000 millilitres.

Mix the calcium lactate with 400 millilitres of the distilled water, and the concentrated phosphoric acid and stir until solution is complete, then add the orange-flower water, dissolve the refined sugar in the mixture without the aid of heat and add sufficient distilled water to produce the required volume; filter.

Dose: ½ to 1 fl. drachm.

LIQUID EXTRACT OF KALMEGH (I. P. L.)

Kalmegh	500	grams.
Oil of fennel	2	millilitres.
Oil of ajowan	2	„

Alcohol (90 p. c.) sufficient quantity.

Boil the Kalmegh with 1500 millilitres of distilled water for half an hour and strain. And further 1500 millilitres of distilled water, are boiled for half an hour, strain. Repeat the process until a total of 2000 millilitres of the extract are collected. Mix and concentrate to 250 millilitres on the water bah. Dissolve the oil of ajowan and oil of fennel in 200 millilitres of alcohol (90 p.c.), and add this alcoholic solution to the concentrated extract. Determine the content of andrographolide and add enough alcohol to produce a compound liquid extract of Kalmegh of required strength.

Dose. 8 to 15 minims.

BABY OIL

Olive oil	15	c.c.
Oxyquinolene base	0.12	grams.
Rosemary oil	0.06	c.c.

Light liquid petrolatum a sufficient quantity to make 120 c.c.

Dissolve the oxyquinolene base in a mixture of the olive oil and liquid petrolatum with the aid of heat on a water bath. When cool add the rosemary oil. This prescription contains 12½% of olive oil in light petrolatum, and oil of rosemary to perfume. It is made antiseptic by the addition of oxyquinolene base.

CREAM FOR BURNS

Sulphanilamide	3	parts.
Glycerine	10	„
Groundnut oil	25	„
Lanette wax or beeswax	10	„
Water	52	„

Mix the first two and last three ingredients separately then mix together.

SPLEEN POWDER

Ginger (Sonth)	10	grains.
Rhubarb (Raven Chem)	5	„
Ferri Sulph	2	„
Quinine	2	„

Mix and make one packet. This is for one dose.

SYRUP OF TOLU. (B. P.)

Balsam of tolu	25	grams.
Sucrose	660	„

Distilled water, sufficient to produce 1000 c.c.

Add 400 c.c. of boiling distilled water to the balsam of tolu, contained in a tared vessel; cover it lightly and boil the contents gently for half an hour, stirring frequently. Add distilled water if necessary so that the contents of the vessels weigh 360 grams. Cool, filter the solution, add the sucrose, dissolve by the aid of a water-bath and finally add sufficient distilled water to produce the required weight.

CHEST RUBBING OINTMENT

Gum camphor	6	oz.
Menthol	8	„
Methyl salicylate	6	„
Eucalyptus oil	10	„
Cajuput oil	10	„
Turpentine oil	8	„
Petrolatum, white or yellow	16	lbs.
Paraffin	1½	„

Melt the paraffin and petrolatum over slow fire or over water-bath. Then remove from the source of heat and incorporate the other ingredients one by one. When the whole mixture is about to congeal pour in wide-mouthed phials of usual size. Lastly close the lid tightly.

SULPHUR OINTMENT

Precipitated chalk	10	grams.
Sublimed sulphur	15	„
Oil of cade	15	„
Soft soap	30	„
Lard	30	„

Melt the lard with the soft soap and oil of cade, then gradually incorporate the sublimed sulphur and precipitated chalk and rub the ointment until it is smooth.

ANTI-RHEUMATIC ELIXIR

Quinine sulphate	30	gr.
Acid sulphuric, dil	½	dr.
Potassium iodide	1	dr.
Spt. colchicum	½	dr.
Tr. auranti	2	dr.
Spirit chloroform	2	dr.
Water to make	8	oz.

Dose: ½ oz. twice daily.

—Recipes for Small Manufacturers

ENVELOPE ADHESIVE

(a)	Dextrin, white	200	parts.
	Water	240	„
(b)	Boric acid	2	„
	Glycerine	5	„
	Water	20	„
(c)	Thymol (10% alcohol solution)	½	part.

Dissolve (a) at 90°C add (b) and ultimately (c) as preservative

SOLID STENCIL INK

A black, soluble stencil ink for marking chests and bales is made by allowing 80 parts of good glue to swell up in water for 12 to 24 hours, and then dissolving it by applying heat on a waterbath, in 450 parts of fresh water along with 16 parts of yellow dextrin, 6 of sugar, 22 of glycerin, and 26 of water-soluble nigrosine. The solution is next incorporated, by stirring, with 400 parts of lamp black to form a paste, which is then thickened by further heating on the water-bath, until a small sample is found to set hard on cooling. All the superfluous water being thus evaporated, the mass is pressed in greased moulds. The addition of a little ox-gall will help the ink to run freely when used on greasy material.

EAU-DE-COLOGNE

Bergamot oil	1	oz.
Lemon oil	½	„
Rosemary oil,	2	dr.
Neroli oil	30	drops.
Lavender oil	4	dr.
Orange oil	2	„
Rectified spirit	2	lbs.

Mix the ingredients with brisk shaking one by one. Set the whole aside in a stoppered vessel for 2 weeks and during that period shake the vessel thrice daily at a time, finally filter and pack.

GREEN MARKING CRAYONS

Ceresin	8	oz.
Carnauba wax	7	„
Paraffin wax	4	„
Beeswax	1	lb.
Talc	10	oz.
Chrome green	3	„

Melt the first four ingredients in any container and then add the last two slowly while stirring. Remove from the heat then continue stirring until thickening begins. Then pour into moulds. If other colour crayons are desired, other pigments may be used. For example for black, use carbon or bone-black; for blue Prussian blue, for red, orange chrome yellow.

TAILOR'S CHALK

Tailors' chalk may be prepared of different colour as follows:—

WHITE

French chalk	20	parts.
Pipe clay	20	„
White curd soap	6	„

Make into a stiff paste with water and dry.

BLACK

Soapstone	56	parts.
Bone black	8	„
Yellow soap	6	„
Gum arabic	3	„
Glycerin	1	part.

Dissolve gum in water, add glycerin, mix in pigments; grind to a smooth paste with water and mould.

SOAPLESS LIQUID SHAMPOO

Saponin	2	parts.
Rose water	30	„
Perfume	1	part.
Alcohol	15	parts.
Distilled water to make	100	„

To prepare this, dissolve the saponin in the rose water. Then add the alcohol containing the perfume, and make up the mixture to 100 parts by adding distilled water. It may be tinted yellow with a trace of yellow dye. Distilled-water may be substituted with rose water, and a little phenylethyl alcohol.

PREPARATION OF SILK GUT

Silkworm gut is used for surgical sutures (for this purpose it is dyed, treated with preservative, and sterilised), but the main use of silkworm gut is for fishing casts. Heavy casts are made up from the coarser samples of silkworm gut but the finer casts are made from silkworm gut that has been drawn through dies in order to obtain the necessary regularity and fineness The method of preparation of the gut is as follows:—

The content of the silkworm gland is normally extruded by the silkworm through its spinneret in order to produce a fine filament from which the cocoon is constructed. The conversion of the water-soluble contents of the gland into an insoluble material is brought about during the passage of the silk material through the fine duct of the spinneret and a similar phenomenon can be effected by direct manipulation of the silk gland itself. For this purpose, the silk are removed from matured silkworms and soaked in a solution that generally contains acetic, citric, tartaric, or some other organic acid, together with some hardening agent, such as formaldehyde After a suitable time of treatment the silk gland is grasped at each end and stretched rapidly and steadily. When the gland has been extended to a length of 10 to 15 inches, it becomes incapable of further extension and is now in the form known as silk gut. The prepared lengths of gut are then washed and bleached either by chemical agents or by exposure to sunlight.

—IN THE FIELD OF INVENTION

VITAMIN-ENRICHED RICE REDUCES BERIBERI

Millions of people in Asian countries, where white polished rice is a food staple, may have new hope, through this experiment, of avoiding the crippling disease. Beriberi is caused by malnutrition, which is often the result of living almost entirely on white rice. One remedy is to enrich the rice, which has lost its vitamin content through processing, by artificial addition of vitamins.

Experts indicate that if rice were eaten only in its natural form there might be no beriberi. But most people in Asia, as in the United States, will not eat unmilled rice. They want it white and rid of its natural coat. Moreover, rice that has been milled can be stored longer without spoilage.

Before it is milled and polished, rice has a coating of bran and germ that contains most of the grain's vitamin and mineral richness.

White rice may be artificially enriched by adding a coating of thiamine (Vitamin B1), niacin, and iron. This process, developed by the Hoffman-La Roche. Chemical Corporation in the United States, is the basis of the experimcnt on Bataan.

NEW COATING INTERMEDIATE

A new baking-type coating intermediate that is expected to form a base for a whole new field of protective coatings has been developed in the U.S.A. by the chemical division of the General Electric Corporation, Calud R-108 and said to combine outstanding chemical resistance, this intermediate has been described as a new concept in coating materials. Based on selected phenol derivatives developed in the General Electric Laboratories, R-108 is compatible with a variety of coating resins. Among qualities claimed for it are resistance to alkalis, acids, oxidising agents, solvents, salts and other corrosive chemicals over a wide temperature range extreme toughness, flexibility and resistance to abrasion, and unusual stability to ageing at high temperatures.

ADVANCED TYPE OF CRUCIBLE

An advanced type of crucible, suitable for fusing metals and other substances at high temperatures, is being manufactured by an Australian Company Wat Waratch, New South Wales. The crucible eliminates annealing, has very high refractory characteristics, and has self-glazing properties which prevent oxidation. Its high thermal conductivity causes a faster melting of metals than in the usual type of crucible.

PROMACETIN FOR LEPROSY

Successful treatment of leprosy is claimed for promacetin, a new drug developed in the U.S.A. A white crystalline compound, taken by the mouth, promacetin is said to bring quicker relief with fewer adverse reactions than other leprosy drugs.

CASTOR OIL GEL

It is understood that various applications of the substance known as castor oil gel for the paint and plastic industries have been developed as a result of research conducted at the National Chemical Laboratory, Poona. This gel is obtained by prolonged heating of castor oil. Following detailed chemical examination of the constituents of gel, a series of graded fractions were isolated from the product at the laboratory. Gel fraction, soluble in benzene alcohol mixture or petrolether was found useful after suitable treatment in the preparation of plastic compositions and as a coating composition in combination with drying oils. It also proved to be a satisfactory substitute for varnishes and solvent lacquers.

ECONOMICAL TUBE-CUTTING MACHINE

The cutting of tubes to predetermined lengths has mostly been performed by means of a hacksaw or circular saw. This will suffice for only small numbers of pieces, but the cutting time is high and the waste of saw-blades is greater when cutting-tubes than when cutting solid iron. The tube-cutting machine "Roma" manufactured from Eyring und Scheelke will perform cutting 75 times as quick as done with a hackshaw. The tube to be cut is put on rolls and the rotating knife guided aginst the tube. By this fact the tube is set into rotation and the knife cuts in a few seconds the tube into two pieces.

The efficiency of his machine is about 2.000 cuttings per hour, and the working range for tubes from 0,42 inches to 8,33 inches in diameter at 0.25 inches or even 0,33 inches and 0,42 inches thickness.

The machine is of a robust construction and can be operated by unskilled workers. It considerably saves time and the expenses for tools are very small. The smooth round knife can be sharpened as soon as being dull until the necessary diameter has become too small.

This machine is particularly used in railway-workshops, machine-factories, tool-factories, tube furniture and bicycle factories, dockyards as well as workshops of big textile and chemical factories etc. — MEDIATOR

—FORMULAS, PROCESSES & ANSWERS

REFINING AND DEODORISING MINERAL OIL

2541 S.C.M., Jainur—Desires to know the process of refining and deodorising mineral oil.

There are various processes of refining mineral oils but the following methods are more or less cheaper and their manipulation easy.

I.

Potassium permanganate	1	pound.
Water	8	gallons.

Mix.

Now take 1 cwt. (112 lbs.) of the oil to be refined in a galvanised tank and warm it to 120°F. Keep the oil at this temperature by regulating the fire. Next add 3 pounds of the permanganate solution with stirring. Agitate for 45 minutes. Then take a small sample and observe, if the result is satisfactory allow to settle, and draw off by syphon. If the result is not satisfactory, add more permanganate solution and proceed as above until the result is obtained.

II.

Mineral oil or kerosene oil may be bleached and deodorised by the following method:—

Shake first the oil with 8½ tolas of bleaching powder for every 1 gallon of oil, adding a little hydrochloric acid. After shaking for 15 to 20 minutes transfer the liquid to another vessel containing 1 pound quicklime and again shake until the smell of chlorine is removed. After standing for 24 hours decant the oil.

It is found that oil after treating by any of the above 2 methods still retains a mild odour of kerosene. To mask this unpleasant odour an addition of 1 per cent of amylacetate may be used.

AIR-DRYING BLACK ENAMELS

A quick air-drying black varnish for all sorts of iron work can be made by melting 28 lbs. of coal-tar pitch with 28 lbs. of asphalt, and boiling for 8 hours, with subsequent addition of 8 gallons of boiled linseed oil, which is incorporated by heat. After adding 10 lbs. of litharge and 10 lbs. of red lead, the mixture is boiled until the mass will set hard between the fingers. On cooling, the mixture is thinned with 20 gallons of turpentine. The varnish will dry in 1-2 hours.

LIQUID BURNISHING WAX FOR SHOE SOLES

2579 R.C.T., Agra—Desires to know formulas of preparing liquid burnishing wax for shoe soles, etc.

Carnauba wax	20	parts.
Turpentine oil	20	„
Black dye (Oil soluble)	3	„
Duponol W. E.	5	Parts.
Ferric acetate	6	„
Glacial acetic acid	½	part.
Water	46	parts.

Reduce the ferric acetate to a powder and dissolve same in the acetic acid and water mixture. Dissolve the duponol in the above solution and heat to about 170°F. Melt the carnauba wax and pour into the turpentine oil which has been previously heated to above 180°F. dissolve the black dye in this latter solution to the former with agitating vigorously. Allow to cool with continued agitation.

HEEL POLISH

Candelilla wax	9	parts.
Rosin	1	part.
Carnauba wax	32	parts.
Black dye (oil soluble)	6	„
Carbon black	½	part.
Hard paraffin	1	„

Melt the solids all together over fire. Then mix the dyes. Lastly cast in moulds.

NUT BUTTONS

2607 D.A.W.W., Poona—Wants to know a process of making nut buttons.

Nut buttons are generally made from corozo nuts. A series of operations are involved in the formation of buttons from this nut. At first the nuts are dried from three to six weeks, and then they are placed in revolving drums containing weights which crack off the hard shell. After this they are taken to the "scabbing table", where they are inspected for small particles of the shell which may not have been removed. From the "scabbing table" they are cut into pieces of slabs. The slabs are put through a period of drying to prevent any wraping, after which they are again sorted by machinery before going to the "turning room". Here they are put into a hot bath to moisten the outer surface and prevent cracking, after which they are placed on the lathe and rapidly turned into a finished button blank.

The blanks are next bored with necessary holes by means of automatic drilling machines. They are then placed in "tumbling barrels" containing polishing material, which gives a very smooth surface and prepares for dyeing.

If the buttons are to be mottled, they are first soaked to open the pores, then placed face up on a pin board, which goes to a dyer, who places a chart over the board and with the aid of an air brush sprays the buttons with a "resist dye". The chart is removed and the board goes to a second dyer, who with the aid of a similar chart sprays the buttons with the colour dye.

The buttons are well dried, taken from the pin board and placed in a bath, or "developer", which brings out the spray colour and makes it fast. The "resist" is now removed, and the

button is complete though dull in appearance. In order to bring out the colour and finish, the buttons are again put into the polishing drum, and when taken out have a high lustre. After the buttons have been coloured the finishing process depends on the style and effect desired. The buttons may pass through the finishing processes. These are known as buffing; hand polishing; automatic and machine polishing; dressing; carving; milling; sand-blasting; shanking; satin finishing; lettering and so forth. The finished buttons are then sorted and stitched into cards.

ARTIFICIAL PEARL SAGO

2620 S.P.M., Salem—Wants to have a process of making artificial pearl sago.

Artificial sago is generally prepared with highly refined potato starch. The drying is continued until a mass is obtained which, when passed through a screen, forms granules which neither stick together nor fall to pieces. If this consistency be lacking, it can easily be attained by very little manipulation. If the starch is too dry, a little freshly-washed and still quite wet starch is added until the desired effect is produced; on the other hand, if it be too wet, some perfectly dry starch is added.

The granulating apparatus consists of a screen the sheet metal bottom of which is pierced with perfectly found holes, the size of which varies from that of a lentil to fine barley groats, according to the grain-size desired.

The dough is placed on this screen and covered by a heavy plate which presses the mass through the holes. Jolting the screen detaches the granules on to an endless band underneath.

The granules are left exposed to the air until so dry that they will not stick together when shaken up in a glass, but form rounded grains and a little dust resulting from mutual friction.

The angular granules are rounded in a rolling drum rotating on a shaft. This drum is filled about two-thirds full and is turned for 15-20 minutes. The contents are transferred to a large, fine sieve, to remove the dust, and are afterwards classified on a series of super imposed screens of diminishing mesh.

The granules form white opaque masses which require further treatment to impart the glossy, translucent appearance characteristic of sago. This treatment is termed glazing or polishing.

Glazing is effected by (partly at least) gelatinising the surface and drying it at the same time. With this object, the granules are spread thinly on iron trays and placed in a box heated to 160-170°F by hot air. Before being admitted into the box, this air is passed over a vessel of boiling water, thus becoming saturated with moisture which then gelatinises the surface of the granules.

When a sample shows that gelatinisation has commenced, the water vessel is removed, and the hot air is passed over the granules until they have become quite dry and hard. If the treatment has been properly carried out, the granules have now a handsome white glazed aspect and are perfectly hard. On being stirred into hot water; they swell up rapidly to perfectly transparent lumps, which will retain their shape, unless the water is boiling hot, because the interior is not yet completely swollen.

To obtain sago with a yellowish tinge, the original wet starch is tinted with a little caramel; or the finished granules are allowed to roll over a sloping plate heated to about 300°F. This browns them superficially, and any desired yellowish or brownish shade can be obtained by mixing them with white granules.

BOOT POLISH

2636 R.G., Agra—Wishes to have a good formula of boot polish.

Shellac wax	3 lbs.
Bees wax	1 lb.
Hard paraffin	3 lbs.
Soft soap	1 lb.
Turpentine oil	1½ gallons.
Oil soluble dye	1 oz.

Melt the wax over slow fire in capacious iron pan. Next add the soap and heat to dissolve. Then slowly stir in the turpentine oil and lastly dye dissolved in a little turpentine oil; when thoroughly mixed extinguish the fire but go on stirring until the mixture begins to thicken. At this stage pour in tins.

For black use nigrosine oil soluble, for tan use waxoline mahogany and for brown Bismark brown.

CEMENT FOR FILMS

2839 M.V.B., Bombay—Wishes to have a good formula of preparing cement for films.

To cement together celluloid and cinematograph films prepare the following:—

Soak 25 ounces isinglass in cold water until it becomes soft, then press out the superfluous water and place it in a pan over heat until it becomes tacky or into a heavy liquid.

Separately dissolve in 5 ounces of alcohol, 2 ounces of gum ammoniac and 1 ounce of gum mastic and into this add the isinglass solution. Stir the resulting heavy cement rather briskly until well mixed, clean well celluloid pieces to be cemented before using above cement.

MICANITE

2737 I.B., Nellore—Desires to learn the process of making micanite.

Micanite is made up by laying on a table (without paper) or on a clean thin sheet of paper an overlapping layer of Mica Splittings in a manner so as to leave no space between. These Splittings should be one thousandth of an inch (i.e. .001" or 1 Mil) in thickness or still thinner. These are then brushed over with strong insulating varnish (ordinarily shellac is used in case of Hard micanite and oil copal varnish is used in case of Flexible Micanite). The latest improved insulating binder is Glyptal,—discovered and patented by the General Electric Co.

Another overlapping layer of Mica Splittings is then placed on the varnished surfaces while the latter is still wet, in such a manner that the joints in the lower layers are covered up by the whole pieces and process is repeated, until a plate of the desired thickness is obtained. In order to drive off the volatile solvents used in the preparation of varnishes, the freshly made Micanite plates are placed on a steam-heated table or a hydraulic press for a definite period and the Boards are baked under pressure and machined into required dimensions and thickness. This period depends on the purpose for which the Micanite is to be used. The quality of the Mica Boards will vary according to temperature, pressure and binder, employed at this stage and in course of the processes of manufacture. If a Hard Sheet is to be made, Hydraulic Press for a just sufficient time to the Micanite Sheets are to be placed on a soften and compress the material and while still being subjected to pressure, is cooled by circulating water through the plates of the Press. The percentage of bond in the finished Micanite Plates usually varies from about 10 per cent in the Moulding Micanite to about 1 per cent in the commutator segment Micanite.

The varnish or binding material is almost entirely pressed out of the Micanite during this process in case of compressed Micanite so that the finished product may not contain more than 1 to 2 per cent of the binder. For common insulating purposes, Built-up Mica in some respects, is as good as the Natural Mica and superior to it from consideration of more convenient adaptibility to any desired shape, to suit different special requirements. Micanite Sheets are principally consumed in the manufacture of Commutator segments and in various forms of Dynamos, Motors ard Transformers etc.

BONE SUPERPHOSPHATE

2667 R. N. M., Berhampur—Desires to know a method of manufacturing bone superphosphate.

The modern method of manufacture of this valuable substance comprises three principal operations: (1) Grinding the raw materials; (2) rendering the ground raw phosphate solution in sulphuric acid; (3) the drying of the superphosphate.

Raw phosphate should be carefully ground by means of ballmills, runners or flatstone mills; because it is found that the fineness of the phosphate contributes to a great extent to a perfectly successful superphosphate. Thus the powder should not leave more than 10 per cent of residue on a 70 mesh sieve and this residue should not exceed the size of groats; it is only at this cost that all the phosphoric acid is rendered soluble. The ground material is then put into a mixing machine. It consists of an egg shaped cast iron pan 64 inches wide at the top and 48 inches wide at the bottom, fitted with two discharge doors, with lever and counterpoise, which enables the mixing to be run into an enclosed space, called the decomposition chamber sunk in the ground. In the pan a vertical shaft turns, driven by a cog-wheel gearing and carrying blades of a special form arranged in a helicoid manner these lifts throw down and triturate the mass and prevent it at the same time from being deposited and attached to the sides. It suffices to pull the bent levers to open the discharge doors and thus let the liquid fall into the decomposition chamber.

Now to render the ground raw phosphate soluble in sulphuric acid, the material is put into the mixer and the required amount of cold sulphuric acid of density between 50° and 55°Be. The machine is started at once. When proper mixing has been obtained, the mass is thrown down to the decomposition chamber by opening the doors.

Owing to the gas given off, the thick liquid effervesces; at the same time it heats up to 248° to 302°F. Gradually it settles in the den, and after an hour it sets. An addition of dolomite keeps it liquid for some time longer, so that the water evaporated is then much greater.

All the heat given by the reaction ought to be utilised with that end in view, that is carrying off the water. It is only when this is done that perfect solution is realised, and that a superphosphate that will behave well on subsequent manipulations is obtained.

WOOL CARDING

2739 S. B. C., Banda—Desires to know the usual method of carding wool.

Although remarkably cleaner, the wool has not inevitably lost all its sand and vegetable adherents, but these are lessened upon by the carding operation. The indigenous method of carding is carried out by a bow. The operator squarts and places a mass of wool upon the ground in his iron. He holds the bow in his left hand and pulls the string with a mallet into the mass of wool with his right hand and then lets it go. The string, when vibrate tears away with it part of the wool from the mass and separates the fibres. This process is continued till the whole of the wool is reduced to a satisfactory fluffy condition.

In foreign countries, however, this operation is carried out by a type of machine known as "cards" which is fitted with a large cylinder, is itself furnished with bent wire teeth and the minor cylinder working upon its circumference are fitted with the same in varying degrees of fineness, sharpness, and strength. After teasing out the wool into a filmy veil, thus freeing it from all the sand and many of the vegetable burrs, the sarding engine eventually brings the filament together, and these, passing quickly through a funnel, form a rope of silver sufficiently coherent to undergo subsequent treatment in this continuous form. The wool passes to the back-washing machine to be washed free of any impurities which may still sully its colour and to be

dried continuously in a compact hot-air chamber. The material is oiled by measured drops of the best olive or sesame oil as it passes through "gilling" machine designed to straighten the fibres of the silver preparatory to their passage into the comb.

COPPER-AMMONIUM CHLORIDE

2751 S.R.M., Kumbakonam — Desires to know the process of obtaining copper-ammonium chloride.

To obtain this complex salt conduct ammonia gas over an anhydrous cuppric chloride whereby the ammonia gas is eagerly absorbed, with the formation of this complex copper-ammonium chloride.

BARIUM HYDRATE

Barium hydrate is formed on slaking barium oxide with water. It is soluble in 3 parts of boiling water and 20 parts of cold water, thus producing a strongly alkaline liquid, from which a crystalline hydrate may be obtained. On a large scale the hydrate is prepared by passing superheated steam over heated barium carbonate.

THROAT TABLETS

2564 T.S.G., Kalyan — Wishes to have a formula of throat tablets.

Citric acid powder	2 oz.
Milk sugar, powder	2 lbs.
Sugar, powder	3 „
Gum acacia, powder	4 oz.
Carbolic acid	½ „
Menthol	½ „
Tincture iodine	4 fl. oz.
Formalin	3 „
Simple syrup	sufficient quantity.

Mix all the ingredients excepting carbolic acid, menthol and tincture of iodine, to a damp powder and pass through a 20 mesh sieve and dry. When ready for compressing, add the remaining three. Dry again in a warm Place. Make 15 gr. tablets.

ARTIFICIAL MARBLE

Artificial marble consists of alum and barium sulphate (heavy spar) with addition of water and the requisite pigments. The following proportions may be serviceable.—

Alum	1000 parts.
Barium sulphate	10 to 100 „
Water	100 „

The amount of barium sulphate may be governed by the degree of translucence desired. Dissolve the alum in water with the aid of heat. As soon as the solution boils mix the barium sulphate powder. Stir with a rod and add the pigment. Boil the whole until the mixture gives up 3 per cent. of its weight. At this stage the mass exhibits a density of 34°Be at a temperature of 212°F. Allow the mixture to cool with constant stirring until the substance is semi-liquid. The resultant mass is poured into a mould covered on the inside with several layers of collodion and the mass permitted to cool completely in the mould, whereupon it is taken out and dried entirely in an airy room. Subsequently the object may be taken out of mould and polished.

PHOTOGRAPHIC COLLODION

2800 G.C.M., Delhi—Wishes to have a formula of preparing photographic collodion.

Pyroxylin	15 gr.
Cadmium iodide	15 „
Ether	3½ „

Place the first two in a dry bottle, then pour in the alcohol. Shake the mixture well and add the ether, shake again and let it stand for 12 hours. Decant the clear portion into a wide mouthed bottle, keep well stoppered and in the dark. Avoid shaking the bottle when about to use the collodion, and never quite use all the bottle contents, as the sediment which will accumulate at the bottom would spoil the picture.

ETCHING POWDER

Etching powder for metals like tin, silver, iron, german silver, copper, and zinc may be prepared by mixing:—

Blue vitriol	1 part.
Ferric oxide	4 parts.

Mix. This mixture may be moistened and applied to the places to be etched.

GLUE FOR LINE WORK ON ZINC

Fish glue	5 oz.
Distilled water	100 fl. oz.
Ammonium bichromate	¼ oz.

Dissolve the fish glue in the distilled water and add the ammonium bichromate. Then add ammonia solution drop by drop until solution changes to bright yellow.

BLEACHING BEESWAX

2825 S.N., Pakyong—Desires to know a method of bleaching beeswax.

Pure white wax is obtained from the ordinary beeswax by exposure to the influence of the sun and weather. The wax is sliced into thin flakes and laid on sacking or coarse cloth, stretched on frames, resting on posts to raise them from the ground. The wax is turned over frequently, and occasionally sprinkled with soft water if there be not dew and rain sufficient to moisten it. The wax should be bleached in about 4 weeks. If, on breaking the flakes the wax still appears yellow inside, it is necessary to melt it again, and flake and expose it a second time, or even oftener, before it becomes thoroughly bleached, the time required being mainly dependent upon the weather. There is a preliminary process, by which, it is claimed, much time is saved in the subsequent bleaching. This consists in passing melted wax and steam through long pipes, so as to expose the wax as much as possible to the action of the steam; thence into a pan heated by a steam bath, where it is stirred thoroughly with water, and then allowed to settle.

The whole operation is repeated a second and third time, and the wax is then in condition to be more readily bleached.

TOILET SOAP BY COLD PROCESS

2838 W.V., Anakapalli—Wants a process of making toilet soap by cold process.

Tallow	38	lbs.
Coconut oil	38	„
Caustic soda lye 38°Be	37½	„

Melt tallow and coconut oil over slow fire and strain through a piece of fine cloth. Then run in the lye, add the colour ½ oz. if so desired, dissolved in a little boiling water. Now add the filling (if any), and lastly add the perfume. Put in frames, have two days, then cut and stamp. Dry (1 to 2 days) in open air and pack.

PERFUME MIXTURE

Lavender	6	oz.
Linalol	3	„
Clove oil	1	„
Cassia	1	„

DEVELOPER FOR COPYING AND PROCESS NEGATIVES

Distilled water at 125°F	35	fl. oz.
Metol	7½	grains.
Sodium sulphite (anhydrous)	1¾	oz.
Hydroquinone	75	grains.
Sodium carbonate (desiccated)	3½	oz.
Potassium bromide	15	grains.
Sodium chloride	15	„

Develop 6 minutes. Dilute 1 part to 2 parts of distilled water.

LIQUID BINDI

2844 S.K.S., Puri—Wants to have a formula of liquid bindi.

Gum arabic	4	oz.
Water	8	fl. oz.
Magenta	1	oz.

Put the gum arabic in the water and keep it overnight. Then stir with a rod and warm gently to dissolve it completely. While still hot add the magenta or any other suitable synthetic red dyestuff. Lastly add 100 grains of boric acid into the hot solution. Allow the whole to cool and then put in phials.

SCENTED HAIR OIL

2883 N.J.V., Murtazapur—Wishes to have a recipe of scented hair oil.

Refined sesame oil	20	lbs.
Red dye (oil soluble)	60	grains.
Narcissus oil	2	oz.
Lavender oil	4	dr.
Bergamot oil	2	„
Sandal oil	2	„
Musk otto	2	„
Khus oil	1	„

Dissolve the dye in the oil. Then strain through a cloth and mix the essential oils.

BLUE-BLACK FOUNTAIN PEN INK

2908 P.N.V., Delhi—Desires to know the good formulas of fountain pen ink, etc.

Tannic acid	2½	oz.
Gallic acid	5	„
Ferrous sulphate	8	„
Gum acacia	½	„
Hydrochloric acid (concentrated)	2	drams.
Ink Blue	2	oz.
Rectified spirit	2	fl. oz.
Carbolic acid	1	oz.
Distilled water	450	fl. oz.

Take one enamelled vessel and put into it 400 ounces of the water. Boil the water and drop into it the gum arabic after breaking into small pieces. Next put the gallic and tannic acids and continue heating.

In the meantime dissolve the ferrous sulphate in the remaining water and add to it the hydrochloric acid.

Now slowly mix the solution into the boiling gallic and tannic mixture. After this mix the ink blue and carbolic acid. Take down from the oven and set aside to cool. Keep undisturbed for about 4 weeks. Then strain through a thick cloth and mix the rectified spirit and pack in 4 oz. pots.

CARBON PAPERS

Lard oil	20	oz.
Glycerine	10	„
Spirit	5	„
Graphite	10½	„
Methyl violet (soluble)	20	„

Mix well. Apply the composition over the surface of suitable paper with a stiff brush.

TYPEWRITER RIBBONS

Typewriter ribbons are made by saturating cotton ribbons with special type of ink. This is done by passing the ribbons under a series of rollers. One of these rollers is coated with a film of the ink paste, which the pressure of the second rolled causes to adhere to one side of the ribbon after which the other side is similarly coated with the ink. Finally, the ribbon is mechanically cut into measured lengths, rolled and packed in tin boxes.

A typical formula of ink for ribbons follows:—

Petrolatum	50	parts.
Lamp blak or prussian blue	30	„
Petroleum benzine	10	„
Rect. Turpentine oil	10	„

Melt the petrolatum over water bath and rub into it while hot the lamp black or prussian blue as much as it will take without becoming so dry as to be granular. When partly cool dissolve the whole little at a time in the mixture of petroleum benzine and rectified oil of turpentine. The finished mixture should be of the consistency of fresh oil paint, when it will be ready for applying over the ribbons.

PRINTING NEGATIVE PHOTOGRAPHS

2941 G.L.D., Poona—Wishes to be enlightened with the process of printing negative photographs.

Printing consists essentially of two operations: (1) Choosing the grade of paper to fit the contract of the negative; and (2) choosing the exposure time which will print through the densest part, or high light, of the negative, which must show detail.

The rub for correct rendering of tones, on the paper is the same as for the negative; that is, the tones which fall on the straight-line portion of the curve are rendered correctly, and those which fall on the top and bottom portions of the curve do not reproduce the tones of the negative in their correct relations. In the negative we can generally confine the scale of the subject to the straight-line part of the curve, while in printing we are forced to use the whole curve, including those portions which cannot give a perfectly correct rendering of the tones of the negative.

RE-INKING TYPEWRITER RIBBONS

3183 J.D.A.C., Ambala Cantt. — Want to have a recipe for re-inking typewriter ribbons and also book binder's glue.

For re-inking ribbons use the following recipe: One ounce of methyl violet or other aniline dye; 15 ounces of absolute alcohol: 15 ounces pure glycerine. Dissolve the aniline colour in the alcohol and then add the glycerine. Apply over the ribbons by means of a brush.

BOOK BINDER'S GLUE

A book binding adhesive that spreads rapidly and which produces a smooth, firm, flexible coating is made of,—

(a)	White glue	4 oz.
	Cold water	8 fl. oz.

Soak glue 4 hours in the cold water, the dissolve in a gluepot.

(b)	Corn starch	4 oz.
	Cold water	8 fl. oz

Mix, and pour into 16 fl. of boiling water. Mix (a) with (b) and gently heat for about 10 minutes. If wanted elastic, add 4 fl. oz. of glycerine.

HAIR DYE

Paraphenylinediamine	20 grams.
Bichromate of potash	5 „
Distilled water	1000 c. c.

Perfumed with a little rose water.

Before application of the dye the hair should be washed with soap to remove oil and grease.

The preparation is to be applied on the hairs with a brush. It is sufficient to have the moistened hair exposed to the air for 15 minutes for the tint to be developed. Then well wash with water.

OIL REFINING

10 lbs. of oil are treated with 1.5 to 2 oz. of potassium chlorate dissolved in 2.5 lbs. of water, and 3.4 oz. of concentrated hydrochloric acid. The chlorate solution is added in 3 or 4 batches while hydrochloric acid is added gradually with constant stirring. The operation is best carried out at 90°C and takes about an hour, after which the oil is washed free of mineral acid and dried.

MOTHER OF PEARL BUTTONS

2966 G.P.I., Jaipur—Desires to know a process of making mother of pearl buttons.

The first operation is to cut out the blanks from the shells. A short tube of steel, the diameter of the button, with one end cut round its edge into a saw, is fixed in a common foot-lathe. Then the shell is firmly held against this cutting tool while it is revolving at a high speed, and with some moderate pressure exerted, it cuts pretty rapidly through. The blanks, or "pieces," have then to be "bottomed," which means taking off the rugged outside of the shell by means of the turning tool or the file. This will generally be the underside of the button, and, if turned, it is of a convex shape. The workman has a "chuck" of boxwood in his lathe, slit down with a saw to half its length, with a screw-clamp upon it to tighten it up. On the end or face, he has turned a little recess, corresponding to the size of the button, and when he has pressed open the slit with a sort of jemmy and inserted his pearl blank in this recess, it is held quite tightly enough for his purpose. The turning tool is a triangular chisel of steel, pointed at the end. The pearl shell being very hard, this chisel requires to be frequently sharpened, but when in good order it takes off the superfluous material, in the shape of fine dust, very quickly. The remaining processes consist of "hubbing," drilling, and polishing; the first named being the grinding out of certain little nicks or hollows which are supposed to give ornament. All these are performed in the lathe.

TOOTH POWDER

3065 F.C.D., Mogra — Wants to have a good formula of tooth powder and also of vermilion.

Precipitated chalk	35 parts.
Magnesium carbonate	25 „
Borax	14½ „
Sodium bicarbonate	14 „
Soap, powdered	4 „
Sugar, powdered	7½ „
Methyl salicylate	¼ part.
Menthol	1/10 „
Cinnamon oil	1/5 „

Dissolve the menthol in the methyl salicylate, add the cinnamon oil and then add to borax and mix with sugar. Add to the other ingredients; mix and sift.

VERMILION

Red lead	8 lbs.
Zinc oxide	5 „
Venetian red	1 lb.
Vermilion dye	2 lbs.

Macerate these ingredients thoroughly in a stone morter and set aside for 24 hours in a cool place. Finally reduce it to fine powder and pack.

ARTIFICIAL IVORY

2998 P.G.S., Jullundur City—Wants to have a process of making artificial ivory.

According to a recent process—based on the employment of those materials of which natural ivory is composed, consisting as it does of phosphate and carbonate of calcium, magnesia, alumina, and gelatine—300 parts of lime are first treated with sufficient water to convert it into hydrate, but before it has become completely hydrated or "slaked," 75 parts of an aqueous solution of phosphoric acid is poured on to it and while stirring the mixture 16 parts of ground chalk, 2 parts of magnesia, and 5 parts of alumina are incorporated in small quantities at a time, and lastly, 15 parts of gelatine dissolved in 20 parts of hot water are added. The point to aim at is to obtain a compost sufficiently plastic and as intimately mixed as possible. It is then set aside to allow the phosphoric acid to complete its action on the carbonate of calcium. The following day, the mixture, while still plastic, is pressed into the desired form in moulds and dried in a current of air at about 150°C. To complete the preparation of the artificial product, it is kept for three to four weeks during which time it becomes perfectly hard.

BAKING POWDER

3088 L.G.C., Agra—Wishes to know good recipes of baking powder, ammonia, etc.

Sodium bicarbonate	29 parts.
Cream of tartar	60 ,,
Maize starch	12 ,,

Mix thoroughly and store in air tight containers.

PREPARATION OF AMMONIA

There are various methods for obtaining pure ammonia solution of sp. gr. 8880 from crude obtained as a byproduct in the manufacture of coal gas. The methods consist essentially in redistilling the latter after addition of excess of lime, and after freeing the vapour as much as possible from water by means of a reflux charcoal contained in suitable vessels, and then into pure water.

A simple arrangement for the manufacture of pure liquor-ammonia consists of an ordinary boiler fitted preferably with a reflux arrangement and connected with a series of tanks made of iron or wood lined with lead, and containing trays of slaked lime. Beyond these are a series of absorption vessels. They must be provided with a hydraulic inlet valve to prevent regurgitation and with taps for drawing off the strong liquor into carboys. The boiler is charged with crude ammonia liquor mixed with a large excess of milk of lime. The absorbers are charged with pure water.

RINGWORM OINTMENT

3100 H.G.A., Orai — Wants a formula of preparing ringworm ointment.

Vaseline	8 oz.
Hard paraffin	1½ ,,
Chrysophanic acid	¼ ,,
Ichthyol	1 dr.
oil of cinnamon	10 drops.

Melt the vaseline and paraffin over a water bath and when liquid add the remaining ingredients and stir till cold.

OINTMENT FOR BURNS

Aluminium naphthol disulphonate	2 parts.
Ichthyol	4 ,,
Phenol	2 ,,
Lanolin	62 ,,
Petrolatum	30 ,,

Mix by trituration in a mortar.

DRY DISTEMPER POWDERS

3106 D., Kanpur—Wishes to have formula of dry distempers.

WHITE BASE

Whiting	56 lbs.
Barytes	28 ,,
Plaster of Paris	23 ,,
Glue, powder	10 ,,

Grind thoroughly together.

May be tinted to any of the usual distemper colours for instance.

LIGHT BLUE

White base	112 lbs.
Ultramaring blue	4 ,,
White base	112 ,,
Ultramarine blue	10 ,,

ORANGE CHROME

White base	112 lbs.
Orange chrome	10 ,,
Spanish brown	½ lb.

STONE

White base	112 lbs.
Yellow ochre	6 ,,
Umber	2 ,,

GREEN

White base	112 lbs.
Ultramarine green	14 ,,
Ultramarine blue	7 ,,

RED

White base	112 lbs.
Red oxide	14 ,,
Vermillion Imitation	7 ,

LEMON CHROME

White base	112 lbs.
Lemon chrome	10 ,,
Yellow ochre	1 lb.

—READER'S BUSINESS PROBLEMS

[Reader's business problems will be discussed in these pages. We invite the reader to write us his difficulties. As the department is in charge of an experienced businessman who is specially adept in dealing with such problems and to whom experiences of a large number of successful businessmen are available, his replies will lead the enquirer to a successful career. These replies will be published in the paper only and cannot be communicated by post.]

STARTING A STATIONERY SHOP

3261 K.C. Kanpur—Writes I have a mind to start a stationery shop here. Will you therefore, kindly enlighten me on this business?

There should be a good and pleasant locality for a stationery shop. A railway station may be necessary near the place, but the place should be densely populated. The site should be selected near the bazar or chowk.

In the shop there should be many good almirahs and all of equal size. These almirahs should be arranged in such a way that customers may see the articles very easily. All of them should be nicely varnished and the windows made of glasses. All the almirahs should be arranged in rows on the floor of the ground. There must be some stools so that the assistants can pick up the articles from the upper shelf of the almirahs. Some strong chair should be provided for the customers so that they may purchase articles by sitting on.

Much stocks may be kept, but it is neressary to keep the stock in proportion to the customer's demand. The overstock is sometimes harmful because the articles become bad and rotten. Besides office stationeries and toilet goods you may also stock the following: Biscuits of various kinds; butter of different varieties, fruits in tins; jam and jellies; Liptons and Brookeoond Tea of every size and quality; vinegar; lozenges; Horlicks; Milk food; Toffee and chocolates, etc., etc. From your letters it appears that you are interested in books also. You may stock books prescribed by local schools and colleges Besides text books you may stock general books such as novels, fictions and publications on general knowledge. Two or three almirahs should be kept separated for stocking books on various subjects. Don't stock books just because you think they ought to be sold or because you admire the author yourself. Your customer may not be unto your level and in any way your business to sell them books but not to educate them. Gauge the taste of your public but don't let them see you doing it. Be topical and notice the signs of times and be in advance of the season. Watch the books and book novelties of the season and take full advantage of the time; and put them in a prominent place where enthusiasts may see and possibly buy. You may write to the Controller of Imports, New Delhi for securing Import License.

MAKING MONEY IN A SHOP

2235 S.C.B.R., Madras—Wishes to be enlightened on how to make money in a shop.

The most important factor about making money happily in your shop is your attitude towards it. Too many people enter shop life because they think it is an easy way of making money. You buy goods at one price and sell them at another, and the balance is profit. Actually, making money happily in a shop is one of the hardest ways of choosing a living, but it is also one of the most interesting things.

The fascination of meeting a lot of people, of building up your shop sales, of struggling to master and come out on top of a thousand and one problems that beset the average shop keeper, is perhaps the main reason for success in a shop.

The second reason for success in a shop is understanding your public. It takes pluck to buy, and it takes skill to buy the right goods. Wrong buying kills the shop at birth. All successful shops are built up by skilful, plucky buying and thousands fail because of the failure to accept this first fact.

Some people think buying is a gift—outwardly it is, but I have never met a skilful buyer who is not a master of his line, and his public mind. This skill was not gifted at birth. It has been built up by long study, careful analysis, wise observation and a ready willingness at all times to recognise mistakes one of the most difficult things to bring oneself to be in a shop.

The third reason for success in a shop is a desire to grow. Folk who start a shop as a haven, generally make it a cemetary, where they bury their fondest hopes. As will read, there are many ways to grow, as long as you will grow. On the law of average your shop is but your lengthened shadow. As you grow inside, the shop gives that evidence in outward visible form.

Making a shop pay is a full and absorbing task for to make it more, calls for hard thinking allied to hardwork. Successful shops pay more when they reflect prosperity. Even if you are having a bad time, begin to think good times. Get outside your shop the first opportunity and ask yourself "Does my shop radiate prosperity?" because although the public ought to help the shop that needs help the most, it generally patronises the shop that looks as though the shop confers the favour by being open.

Make your shop look what you want it to be. Remember, the onus is on you and not on the customer. If the customer does not deal with you as you want him to deal, it is your fault. Make your store active, prosperous and good-looking. Show movement and vitality. If necessary paint up and clean up. Dress windows more often; send out more samples. Have competitions among the salesmen. Do something to let the public know you are moving.

—BRIEF QUERIES AND REPLIES

Questions of any kind within the scope of Industry are invited. Enquiries or replies from our experts will be published free of charge in serial order. Questions are replied by post on receipt of As. 8 stamps for each question. Subscribers outside India are requested to send two International Reply Coupons for each question. In order to facilitate the work of Editor's Department and to help prompt action the readers are requested to send enquiries in separate letters.

3095 J.S.Z., Hissar—For required pump enquire of Mirrlees Watson & Co. Ltd., 28, Grosvenor House, Old Court House Street, Calcutta.

3096 C.C.H., Haveri—In manufacturing toilet soap you may use the following compound scent: Bois de rose oil 250 parts; Benzyl acetate 200 parts; Cinnamic alcohol 50 parts; Sweet orange oil 100 parts; Phenylethyl alcohol 100 parts; Ylang-ylang oil 50 parts; Amyl cinnamic aldehyde 19 parts; Undecalactone 1part; Methyl anthranilate 70 parts; Hydroxyl-citronellol 60 parts; Civet extract 3 per cent 50 parts; Jasmine 50 parts.

3097 U.R.U., Bombay—Process of manufacturing confectionery will be found in Manufacture of Confectionery published from this office, price Rs. 3-7- including postage. Machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. You may start a confectionery factory with Rs. 2000 on a small scale.

3098 C.P.L.B.D., Jubbulpore—A good formula of fountain pen appeared in April 1950 issue of Industry.

3099 M.V.N.N., Chalakuti—For home printing machine enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension , Calcutta.

3100 H.G.A., Orai—Formula of ointment required will appear in due course. For learning dentistry write to the Principal, Calcutta Dental College & Hospital, 114, Lower Circular Road, Calcutta.

3101 S.A.W., Khilos—For making shellac water varnish you should use borax. For preserving marking ink you may use carbolic acid.

3102 J.J., Rajkot—Button making machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. Plastic machines may be had of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta and Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta. Plastic powder may be had of Imperial Chemical Industries (India) Ltd., 18, Strand Road, Calcutta. You may also consult Plastic Industry published from this office, price Re. 1/-.

3103 J.P.S.L., Kanpur—Formula of office paste will be found in April 1950 issue of Industry.

3104 S.N.G., Bombay—We have no book on book binding cloth manufacture. You better write to Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta.

3105 M.S.D.C., Delhi—Hosiery machines may be had of Indian Hosiery Machine Makers, Indian Hosiery Machine Makers Road, Ludhiana and Persota Hosiery Machine Makers, Chawl Bazar, Ludhiana. For the books on hosiery factory and cotton factory enquire of Thacker Spink & Co. (1933) Ltd. 3, Esplanade East, Calcutta.

3106 D., Kanpur—Process of manufacturing distemper, and white and coloured chalk sticks appears in this issue. For machines enquire of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

3126 P.G.S., Jullundur City—Formula of plastic moulding with casein will appear in due course.

3127 A.M.B., Dhakuria—A formula of chocolate will appear in due course.

3134 P.R.G., Firozabad—For rubber belt enquire of the following firms: Calcutta Rubber Manufacturing Co., 92, Narkeldanga Main Road; India Rubber Guttapercha and Telegraph Works Co. Ltd., 7, Old Court House Street, Calcutta and Lewis & Taylor Ltd., 6, Church Lane, Calcutta.

3135 G.B.R., Rajahmundry—Process of melting magnesium alloy will appear in due course.

3136 S.W., Madras—It is not possible to manufacture denatured spirit. You should not use benzyl alcohol in place of rectified spirit. You need not secure any special license for manufacturing toilet goods and perfumeries. Other formulas will appear in due course.

3137 A.R.M.J., Jamnagar—In order to remedy the defect of the ink manufactured by you increase the quantity of acid blue.

3142 V.G.B., Gobi—For arms and ammunition write to the following firms: A. C. Coondoo & Co., 170, Dharamtala Street; D. N. Biswas & Co., Dalhousie Square East; Manton & Co. Ltd., 13, Old Court House Street; Nursing Ch. Daw & Co., 9, Dalhousie Square and N. C. Dutt & Co., 1, Chowringhee Road; all of Calcutta.

3143 G.R.G., Kolhapur—A formula of glass cement will appear in due course.

3144 S.P.A., Banaras—A formula of laundry ink appears elsewhere in this issue.

3145 S.S.W., Udamalpet—You should use punnal oil with sodium carbonate when free fatty acid will be removed. Thus purified oil should be used in manufacturing soap by full boiling process.

3146 A.J., Mulky—Present address of the agent of Dr. Madans & Co., (Germany) is not known.

3147 S.A.W., Khilos—For cotton tapes enquire of the following firms: G. D. Banerjee & Co., 51 & 52, Benares Road, Howrah; Kalyan Weaving Mills Ltd., 13A, Sura Cross Lane, Belliaghata, Calcutta and Oriental Tape Mnfg. Co., 301, G. T. Road, Shibpur, Howrah. For readymade clothes enquire of Abdur Razzak Mullick, 2, Chandni Chowk, Calcutta; Kamalalaya Ltd., College Street Market, Calcutta and Kamalalaya Stores Ltd., 156A, Dharamtala Street, Calcutta.

3148 K.M., Calcutta—For Bengali edition of Woolcraft enquire of Kamalaya Stores Ltd., 156A, Dharamtala Street and L. Mullick, Wool House, 183, Dharamtala Street; both of Calcutta.

3150 S.D.G., Kasganj—Following is a formula of boot polish: Shellac wax 3 lbs., Beeswax 1 lb.; Hard paraffin 2 lbs.; Soft soap 1 lb.; turpentine oil 2½ gallons; Oil soluble dye 1 oz. Melt the wax over slow fire in capacious iron pan. Next add the soap and heat to dissolve. Then slowly stir in the turpentine oil and lastly dye dissolved in a little turpentine oil; when thoroughly mix entinguish the fire but go on stirring until the mixture begins to thicken. At this stage pour in tins.

3151 M.B.L.S., Kanpur—Process of manufacturing chemical manure will appear in due course.

3154 N.B.N., Trichur—You may make bust of leaders and sell them in the market. For quick selling you may go from exhibitions to exhibitions which are held in different places at appointed time. You may also sell these through some agents on commission basis. For gold paint enquire of Aukhoy Coomar Laha, 1, Dharamtala Street, Calcutta.

3155 G.K., Bhopal—For a book on advertising you may enquire of Thacker Spink & Co. (1933), Ltd., 3, Esplanade East, Calcutta. Following is a list of lithographers: S. Antool & Co., Ltd., 91, Upper Circular Road, Calcutta; Imperial Art Cottage, 1A, Tagore Castle Street, Calcutta; Eagle Lithographing Co., Ltd., 26, Christopher Road, Entally, Calcutta; National Litho Works Ltd., 356, Thakurdwar Road, Bombay; Popular Fine Art Litho Works, Suryodaya Mill Compound, Tardeo Road, Bombay and Shri Krishna Art Litho Press, Girgaon Road, Bombay. You may work as a commercial artist during leisure period. You may start manufacture of ink of different varieties with Rs. 1,000.

3156 O.P., Delhi—Process of making mirror and soap powder will appear in due course.

3175 N.S.C., Kaladgi—For services of a chemist you should advertise in daily paper.

3176 P.K.K., Surat—Confectionery making machines may be had of Small Machineries Mfg. Co., R. G. Kar Road, Calcutta. Process of manufacturing glucose will appear in due course.

3177 S.I., Delhi—Collapsible tube making machines are not available.

3178 V.K.A.B., Kammadikottai—Match making machines may be had of Harima Engineering Works Ltd., 69-1, Belgachia Road and Standard Machinery Co., 86-B, Netaji Subhas Road; both of Calcutta.

3179 B.P.B., Dharmanagar—Biscuit making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. Tin cans may be had of Bengal Tin Box Mnfg. Co. Ltd., 1, Jadu Nath Mitter Lane, Calcutta 4. For coloured labels enquire of S. Antool & Co., Ltd., 91, Upper Circular Road, Calcutta.

3180 B.J.D.C., Ahmedabad—For expanded metal enquire of the following firms: Calcutta Expanded Metal Mfg. Co., 1, Jagmohan Mallick Lane, Calcutta; Hindusthan Wire & Metal Products Ltd., 67-74, Stephen House, Dalhousie Sq., Calcutta, and Indian Expanded Metals Ltd., Prospect Chambers, Hornby Road, Bombay.

3181 M.H.G.U., Amroli—Process of manufacturing fish glue will appear in due course. You may emboss on aluminium sheets and apply paint on it. You may write to Photographic Stores & Agency Co., Ltd., 154, Dharamtala St., Calcutta for particulars regarding the camera.

3182 A.A.K., Bombay—We have no book on candle manufacture. An article on candle manufacture appeared in April 1950 issue of Industry. Price of Manufacture of Soap is Rs. 4-7 including postage. An article on incense stick manufacture appeared in January 1951 issue of Industry.

3183 V.P., Ambala Cantt.—Process of manufacturing glue for book binding and ribbon reviving will appear in due course.

3185 R.L.G., Saharanpur—You may start a gelatine factory at your place. You may manufacture gelatine from hoofs, waste hides, etc. You will require a boiler for boiling.

3187 C.I.A., Mauritius—We are not aware of any metal which is not affected by nitric acid. For services of a mistry efficient in manufacturning jeweller's tools and dies advertise in Indian papers.

3188 S.L.S.F.S., Guntur—Process of manufacturing candles will be found in April 1950 issue of Industry. Candle making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta and Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta. Hard paraffin is used as raw materials for manufacturing candles.

3189 S.V., Agra—Plastic moulding machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta and Francis Klein & Co., Ltd., 1, Royal Exchange Place, Calcutta. Plastic powder may be had of Imperial Chemical Industries (India), Ltd., 18, Strand Road, Calcutta.

3190 V.V.G., Belgaum—Process of manufacturing ink will be found in April, 1950 issue of Industry. Process of manufacturing all kinds of tooth powder will be found in Dental Preparations published from this office, price Rs. 3-7 including postage. You have to invest at least Rs. 500 for each item.

3191 G.J., Churu—Process of manufacturing all kinds of soap will be found in Manufacture of Soap published from this office, price Rs. 4-7 including postage.

3192 S.B., Moradabad—Process of stampings on razor blade will appear in an early issue of Industry.

3193 M.Y.K., Muzaffarnagar—Electroplating equipment may be had of Alfred Herbert (India), Ltd., 13-3, Strand Road, Calcutta.

3194 P.T.A., Nagercoil—Soap making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta 4.

3195 T.P.G., Adoore—Chemicals for ink, perfume, confectionery, etc. may be had of Champalal Agarwala, 45, Armenian Street; Calcutta Chemical Co., Ltd., 10, Bonfield Lane; Paradise Perfumery House, 7, Colootola Street and Essence & Bottle Supply Agency, 14, Radha Bazar Street; all of Calcutta.

3196 S.K.M., Delhi—We have no book on torch manufacture. You may however enquire of Thacker Spink & Co. (1933), Ltd., 3, Esplanade East, Calcutta.

3197 V.E.E., Banaras—Conduit pipes may be had of Calcutta Conduits, 6, Kali Krishna Tagore Street, Calcutta; Indian Conduit Industries, Panipat, Karnal; N. Dutt & Co., Ltd., 39-1, College Street, Calcutta and Metro Hardware Mart, 34, Strand Road, Calcutta.

3198 S.R., Berhampore—You may start a biscuit factory on a small scale with hand machine. For machine enquire of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. You may consult Home Industries published from this office, price Rs. 3-7 including postage.

3199 K.S.R., Chuddapah—For rebuilding and rebuttoning of tyres write to Bombay Garage Ltd., Chowpatty, Bombay, and Lucas Indian Service Ltd., 15, New Queen's Road, Bombay.

3200 S.B.M., Bombay—You may consult Manufacture of School Slate published from this office, price Re. 1/15/- including postage. Process of manufacturing lead pencil will be found in Industry Prize Article, Price Re. 1/15/- including postage.

3201 S.R.P., Eluru—Dentists requirement may be had of Ashby & Co., 14, College Street; Bengal Dental Supply Co. Ltd., 275-4, Bowbazar Street; Calcutta Dental & Co., 33, Bow Bazar Street, and Modern Dental & Medical Depot, 51, Chittaranjan Avenue; all of Calcutta. Following is a formula of tooth powder: Precipitated chalk 35 parts; Magnesium carbonate 25 parts; Borax 14½ parts; Sodium bicarbonate 14 parts; Soap powdered 4 parts; sugar powdered 7½ parts; methyl salicylate ¾ part; Menthol 1/10 part; Cinnamon oil ½ part. Dissolve the menthol in the methyl salicylate, add the cinnamon oil and then add to borax and mix with sugar. Add to other ingredients; mix and sift.

3202 G.P., Uravakonda—For pharmaceutical machines you may enquire of Prabartak Commercial Corporation Ltd., 61, Bowbazar Street and Dr. Bose's Laboratories Ltd., 45, Amherst Street; both of Calcutta.

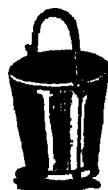
3203 K.L.D., Bombay—Process of brassing by dipping will appear in due course. Formula of oxidizing powder, brown bronze powder and washing powder will appear in an early issue of Industry.

3204 R.B., Lahore—You may consult Manufacture of School Slates price Re. 1/15/- including postage and Prospective Industries, price Rs. 3/7/- including postage.

3205 G.G.S., Moradabad—For the book on oil extraction write to Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta.

3206 I.M.S., Raipur—For wood screw making machine enquire of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta and Marshall Sons & Co. (India) Ltd., 99, Netaji Subhas Road, Calcutta.

3207 L.C., Bombay—Yes, you may start sewing needle manufacture. For steel wire write to Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta.

3208 B.S., Tinnevelly—Confectionery machines may be had of Small Machinery Mfg. Co., 22, R. G. Kar Road, Calcutta. You may consult Manufacture of Confectionery published from this office, price Rs. 3/7/- including postage.

3211 T.G., Coimbatore—Process of electroplating will be found in Electroplating In Practice published from this office, price Rs. 3/7/- including postage.

3212 K.T.C., Bangalore—Following is a list of Mineral merchants. Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane, Calcutta; Indian Mineral Industries Ltd., 22/1, Dum Dum Road, Calcutta, and Travancore Minerals Co. Ltd., Quilon, Travancore.

3213 M.A.S., Kurnool—For carbon rod enquire of Calcutta Carbon Brush Mfg. Co., 21, Parsee Church Street; B. M. Singh & Sons, 1, Crooked Lane, and Boseck & Boseck, Boseck House, 18, Prinsep Street; all of Calcutta. As regards brass caps you should prepare yourself from brass sheets.

3231 K.S.N., Bangalore—Formulas of auto polish shellac compound etc. will appear in due course.

3232 P.R.C., Calcutta—Sewing thread ball making machine may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

3233 K.K.S., Guntoor—For pill making machine enquire of Prabartak Commercial Corporation Ltd., 61, Bowbazar Street, Calcutta. Process of manufacturing essential oil will appear in due course.

3234 S.M., Meerut—For trade mark registration you may negotiate with Dutt & Co., 82, Harrison Road, Calcutta and Law Morris & Co., 19, Strand Road, Calcutta.

3235 S.G.B., Mangalore—Process of manufacturing all sorts of acids will be found in Chemical Industries of India published from this office, price Rs. 3/7/- including postage.

3249 N.I.H., Kampala—Process of manufacturing all sorts of soap will be found in Manufacture of Soap published from this office, price Rs. 4/7/- including postage. Soap making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. You have to invest about Rs. 1 lakh for starting a soap factory manufacturing 1 ton washing soap and ½ ton toilet soap.

3250 F.R.N., Surat—For raw rubber enquire of the following firms: T. V. Kochenvareed, Planter, Trichur, and Trade India (Travancore), Post Box No. 33, Kottayam, Travancore.

3251 J.G.G., Calcutta—Plastic powder may be had of Imperial Chemical Industries (India) Ltd., 18, Strand Road, Calcutta. Plastic machine may be had of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta.

3252 H.S.R., Farrukhabad—Plastic machine may be had of Francis Klein & Co. Ltd., 1, Royal Exchange Place, and Small Machineries Mfg. Co., 22, R. G. Kar Road; both of Calcutta. You perhaps want to manufacture vaseline pomade. Following is a recipe of vaseline pomade: Yellow vaseline 2000 parts; Ceresine wax 500 parts; Geranium oil 5 parts; Lemon oil 3 parts; Clove oil 2 parts. Melt the ceresine wax over water bath. Then mix the vaseline. Remove from heat and mix the essential oils. When it is about to set pour in pots. You may manufacture buttons out of mother of pearls. For paper pin making machine enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

3254 K.C., Ellore—Following is a list of electroplating works: Sen Gupta Electroplating Works, 84, Dharamtala Street; Standard Electroplating Works, 115-A,B, Dharamtola Street, and Metro Electroplaters, 12, Moti Sil St., all of Calcutta. You may consult Dictionary and Manual of Fire Works by Weingart and Complete Art of Fire Works Making by Thomas Kentish.

3255 P.G.P., Bombay—Mica may be had of Premier Mica Mining & Mfg. Co., 32, Gopi Kristo Pal Lane, Calcutta, and Gulamally & Bros., Hararwala Bldg., No. 2, 90, Lohar Chawl, Bombay. Tin foil is generally manufactured and other foils are not manufactured.

3256 K.D.S., Jaipur City—Kieselguhr may be had of Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane, Calcutta. Casein may be had of Allied Agency, 16, Bonfield Lane, Calcutta. Formulas of Oleic acid, Stearic acid, etc. will appear in due course.

3257 C.M.S., Trichur—Stearic acid and titanium dioxide may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta.

3258 K.S.R., Masulipatam—For calcium bisulphate solution enquire of Imperial Chemical Industries (India) Ltd., 18, Strand Road, Calcutta.

3259 A.C., Bombay—Formulas of boot polish, lead pencil, etc., will appear in due course.

3260 J.V.D.S., Ambajipeta—For motor tyres write to Dunlop Rubber Co. (India) Ltd., 57B, Free School Street, Calcutta.

3261 K.C., Kanpur—Reply to your letter will appear under Reader's Business Problem Section.

3262 P.M.S., Bombay—Asafetida is obtained from a plant which grows in Eastern Persia and in Kharasan. It prefers a stony arid soil and is found at an altitude of 7000 ft. The gum is obtained by wounding the upper part of the root, from which a small quantity of a fine gum escapes and is collected. The living root is then sliced daily, or every two or three days with

the exudation adhering to it, till exhausted. The whole mass consisting of alternate layers of root and gum-resin is then packed in a skin. The resin consists of a blackish brown, brittle mass of extremely fetid odour, unadulterated with earth or gypsum, but always with the slices of the root. In Bombay it is sometimes adulterated by the addition of gum-arabic and the cheaper sorts contain an undue proportion of root. Adulteration with sliced potato also takes place.

3263 S.M., Jeypore—For marble stone enquire of B. L. Vaish & Son, Jhori Bazar, Agra and Rising Sun & Co., Kishenpole Bazar, Jaipur City. Bronze statues are not made in India at present.

3264 S.B., Ganapavaram—Following is a list of watch dealers: Arba Watch S. A., Bienne, Switzerland: Fabrique D'Horologeric Lemonia, Orient, Switzerland, and Excelsion Park, St. Imier, Switzerland.

3265 J.M.S., Borsad—Process of manufacturing photographic paper and plate will appear in due course.

3280 B.D., Sangrur—For books on Utilization of Sawdust for manufacturing fibre board enquire of Book Co. Ltd., 4/4A, College Square, and Thacker Spink & Co. (1933), Ltd., 3, Esplanade East; both of Calcutta.

3281 S.K.D., Seoni—For extracting oil you have to use ghanies which may be had of Bharatiya Engineering Works, 370, Upper Chitpur Road, Calcutta. You may consult Manufacture of Soap published from this office, price Rs. 4/7/- including postage.

3282 R.C.S., Etah—Process of manufacturing water colour appeared in January 1951 issue of Industry. Process of manufacturing liquid depilatory will appear in due course.

3283 R.L., Lakheri—For picture postcard enquire of Calcutta Commercial Bureau, 52, Iswar Ganguly Lane, Kalighat, Calcutta.

3285 D.N., Delhi—Process of manufacturing grease and rubber eraser will appear in due course.

3287 R.C.P.S., Hoshiarpur—Formula of artificial mango fruit essence is not available.

3288 H.T.M.C., Bombay—For steel wire enquire of Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta.

3289 P.P.I., Fazilka—For plastic powder enquire of Imperial Chemical Industries (India) Ltd., 18, Strand Road, Calcutta.

3290 D.A.S., Bombay—We have no book on minerals. You may however go through the Report issued by the Geological Survey of India, 27, Chowringhee Road, Calcutta.

3291 S.H.R., Bombay—Process of manufacturing tailor's chalk will appear in due course. An article on wax pencil manufacture will be found in February 1951 issue of Industry.

3292 N.S.V., Murtazapur—Billiard balls are used for playing billiard. Hectograph or duplicator is utilized for making many copies of same letter. Wants to be put in touch with the manufacturer of grass broom.

3293 I.C.U., New Delhi—Industrial machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta and International Trading Co., 22, Netaji Subhas Road, Calcutta.

3294 R.G.K., Bombay—For bleaching and deodorising til oil treat the oil with carlonit 1 p.c., Norit 1 p.c., Anhydrous sodium sulphate 0.5 p.c., Sodiumpersulphate 0.5 p.c. and Sodium perborate 0.5 p.c.

3295 T.M.P., Nadiad—Process of tempering steel will appear in due course. An article on mechanical leather goods manufacture appeared in February 1951 issue of Industry.

3296 K.P., Hardwar—Printing types and other accessories may be had of Rudra & Co., Commercial Type Foundry, 32, Madan Mitter Lane, Calcutta; Eastern Type Foundry, Oriental Printing Works, 18, Brindaban Basak Street, Calcutta; Bodhi Press, 5, Sanker Ghose Lane, Calcutta; John Dickinson & Co., 6, Clive Row, Calcutta, and Indo-Swiss Trading Co. Ltd., P33, Mission Row Extension, Kent House, Calcutta.

3297 C.K.J., Arrah—For tin cans of required description enquire of Bengal Tin Box Mfg. Co. Ltd., 1, Jadu Nath Mitter Lane and National Sheet & Metal Works Ltd., 36A, Sahitya Parishad Street; both of Calcutta

3298 R.B., Purulia—Carnauba wax may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta.

3299 S.S.P., Palghat—You may consult Manufacture of Confectionery published from this office, price Rs. 3/7/- including postage.

3300 M.M.R., Bhavnagar—It is not possible to give description of an auto-spinner.

3302 K.M., Saugor—For registering trade mark you may negotiate with the following firms: A. Mitra & Co., 5-2, F, Raja Rajbullav Street; Dutta & Co., 82, Harrison Road and Law Morris & Co., 19, Strand Road; all of Calcutta.

3303 R.S.S., Rampura Phul—Bone crushing machine may be had of Marshall Sons & Co. Ltd., 99, Netaji Subhas Road and Francis Klein & Co. Ltd., 1, Royal Exchange Place; both of Calcutta. You may consult Utilisation of Common Products published from this office, price Rs. 3/7/- including postage.

3304 J.D.J., Baroda—Milk powder contains minimum quantity of fat but it contains protein. Process of manufacturing tomato katchup will be found in January 1951 issue of Industry.

3317 A.D.D., Bombay—Process of manufacturing butter paper, emery powder, etc. will appear in due course.

3318 S.D.N., Nanpara—Tanning machineries and equipments may be had of A. M. Banerjee, 34, Ezra Street, Calcutta and Martin & Co., 12, Mission Row; both of Calcutta.

3319 R.G.P., Ahmedabad—Perfumes may be had of Paradise Perfumery House, 7, Colootola Street and F. N. Sirkar, 37, Canning Street; both of Calcutta. Bottles may be had of Indian Bottle Stores, 7, Ezra Street; Jai Hind Bottle Agency, 27, Pollock Street and P. S. Dutt & Bros., 8, Ezra Street; all of Calcutta.

3320 S.D.C., New Delhi—For activated carbon enquire of Calcutta Chemical Co. Ltd., 10, Bonfield Lane; Allied Agency, 16, Bonfield Lane and Butto Kristo Paul & Co. Ltd., 1 & 3, Bonfield Lane; all of Calcutta.

3321 V.R., Patna—Printing ink may be had of John Dickinson & Co., 6, Clive Row; Ganges Printing Ink Factory Ltd., 14, Netaji Subhas Road and Hooghly Ink Co. Ltd., 433, Grand Trunk Road; all of Calcutta.

3322 A.C., Mandasa—Address of Central Drugs Laboratory, Govt. of India is 110, Chittaranjan Avenue, Calcutta.

3323 T.K.D., Calcutta—Process of lozenge making will be found in Manufacture of Confectionery published from this office, price Rs. 3/7/- including postage. You may start a lozenge factory with Rs. 2000. Sugar, liquid glucose, edible colour, fruit flavours and acids are generally required for manufacturing lozenges. Lozenge making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. You may start manufacture of ink, agarbatties, taral alta, etc. on small scale.

3324 O.C.I., Kanpur—Process of manufacturing all kinds of ink will be found in Manufacture of Ink published from this office, price Rs. 3/7/- including postage.

3325 B.L.S., Sahibabad—Dewaxed shellac may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta. Film scrap is available from film distributors who sell waste films. Other ingredients may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta.

3341 C.P.L.B.D., Jubbulpore—Formulas of fountain pen ink will be found in April 1950 issue of Industry.

3342 K.S.S., New Delhi—No solvent for bakelite is available. Refer your query to The Industrial & Scientific Research Bureau, New Delhi.

3343 T.N., Teppakulam—Process of manufacturing abrasive wheel, emery powder, etc. will appear in due course. We have no book on the above subjects. Raw materials may be had of Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane, Calcutta.

3344 M.B.C., Amravati—Process of extracting and refining cotton seed oil will be found in our publication Vegetable Oil Industry, price Rs. 3/7/- including postage.

3345 S.K.V., Lucknow—For dry ice enquire of Dry Ice & Refrigerators Ltd., 5, Royal Exchange Place, Calcutta.

3346 I.S., Katni—You may start asbestos cement factory with Rs. 50,000. For machines enquire of Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta.

3347 L.S.R., Galagandapur—You should use a small quantity of gum powder or dextrine in the ink powder when the ink will flow regularly.

3348 S.R.M., Kumbakonam—You should use bronze powder in place of magnesium filings. Quantity should be the same as magnesium filings.

3349 G.L.S., Batala—You may use rubber stamp ink for stamping football cover. You may try the following formula: Methyl violet 1 part; hot water 10 parts; gum arabic 1 part; glycerine 25 parts; denatured alcohol 8 parts. Make a solution of the first three ingredients, add glycerine and alcohol. Filter before packing.

3350 H.R., Agra—All the indigenous herbs may be had of Banshidhar Dutt, 126, Khengrapatty Street and Indian Herb Store, 31, Mallick Street; both of Calcutta.

3351 J.N.P., Mandla—For testing fermentation of Mohua you should use saccharometer which may be had of Adair Dutt & Co. Ltd., Stephen House, 9, Dalhousie Square, Calcutta.

3352 D.T.C., Amritsar—Agent for Quaker Oats in India is Muller & Phipps (India) Ltd., Queens Mansions, Bastion Road, Fort, Bombay. Following is a list of watch dealers: Brand Watch Co. Ltd., Chandni Chowk, Delhi; Imperial Watch House, Chandni Chowk, Delhi; Jewel Watch Co., Chandni Chowk, Delhi; Anglo-Swiss Watch Co., 6-7, Dalhousie Square, Calcutta; Arlington & Co., 13, Old Court House Street, Calcutta; Ghosh & Sons, 161, Radha Bazar Street, Calcutta and Hamilton & Co. Ltd., 8, Old Court House Street, Calcutta. An exhaustive list of watch dealers will be found in Industry Year Book and Directory published from this office, price Rs. 16/4/- including postage.

3353 S.J.S., Delhi—Process of manufacturing glycerine from spent lye will be found in February 1951 issue of Industry. Process of

manufacturing caustic potash will appear in due course.

3354 S.H.R., Bombay—Formulas of boot polish, naphthaline balls and lead pencils will apear in due course.

3355 M.M.B., Nagore—Following is a list of tea merchants: B. K. Saha & Bros. Ltd., 5, Pollock Street; Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road; Brooke Bond (India) Ltd., 2, Metcalfe Street; Imeprial Tea Co. Ltd., 4, Raja Woodmunt Street and Ispahani Ltd., 51, Ezra Street, all of Calcutta. An exhaustive list of tea merchants will be found in Industry Year Book and Directory published from this office, Price Rs. 16/4/- including postage.

3356 B.N.O., Rajkot—You may write to International Institute, Aligarh, for certificate in homeopathy and biochemistry.

3357 O.P.S., Delhi—Process of manufacturing photographic plates and films will appear in due course.

3358 M.G.S., Nasik City—All the ingredients you require may be had of Banshidhar Dutt. 126, Khengrapatty Street, Indian Herb Store, 31, Mullick Street; Champalal Agarwala, 45, Armenian Street and Fuzlehussein & Bros., 44, Armenian Street; all of Calcutta.

3359 S.S., Gorakhpur—Address of Lopcho Trading Co. is not available.

3360 J.E., Seoni—Following is a formula of duplicator: Gelatin 3 lbs.; Water 13 lbs.; Glycerine 3 lbs.; Barium sulphate 7½ lbs.; Sugar 3 lbs.

3361 M.A.J., Cuddalore—All the chemicals and other raw materials may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane; Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane; Paradise Perfumery House, 7, colootola Street and F. N. Sirkar, 37, Canning Street; all of Calcutta.

3362 S.C.I.W., Roorkee—For office file and other equipments enquire of M. Desai & Co., 168, Narayan Dhuru Street, Bombay 3 and Bhajan & Co., 9-1, Jambulwadi, Kalbadevi, Bombay.

3363 M.S., Monywa—We have no such book you may however enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta.

3364 A.S.P., Ahmedabad—Process of manufacturing all kinds of batteries will be found in our publication Manufacture of Batteries. Tin cans may be had of Bengal Tin Box Mfg. Co. Ltd., 1, Jadu Nath Mitter Lane, Calcutta and National Sheet & Metal Works Ltd., 36A, Sahitya Parishad Street; both of Calcutta.

3365 N.D., Calcutta—An article on transfer paper manufacture will be found in February 1951 issue of Industry.

3366 K.B.S., Imphal—You may consult Electroplating In Practice published from this office, price Rs. 3/7/- including postage. But this book is not available at present. You may however enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta.

3386 S.J.S., Kankanady—Process of manufacturing ink will be found in April 1950 issue of Industry.

3387 T.V.R.S., Bhimavaram—Electrical goods may be had of Acharya Bikaner Electric Stores, 32-2, Ezra Street; Commercial Traders, 54, Ezra Street; Indian Electric Mart, 1, Manook Lane; J. N. Electric Co., 50, Ezra Street and Hashang Tangree & Co., 32, Ezra Street; all of Calcutta. Following is a list of paper mills: Bengal Paper Mills Co Ltd., 103, Netaji Subhas Road, Calcutta; Orient Paper Mills Ltd., 8, Royal Exchange Place, Calcutta; India Paper Pulp Co. Ltd., 8, Clive Row, Calcutta; Titaghur Paper Mills, Chartered Bank Bldgs., Calcutta; Upper India Couper Paper Mills Co. Ltd., Lucknow; Sirpur Paper Mills Ltd., Abid Road, P. O. Box 109. Hyderabad and Punalur Paper Mills Ltd., Punalur, Travancore.

3388 M.M., Arrah—It is not possible to manufacture wax on small scale. You better try to manufacture candle which may be manufactured on cottage industry basis. Candle making mould may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

3389 R.V.B., Nairobi—It is not possible to manufacture soap only with either groundnut oil or cottonseed oil by cold process.

3390 S.W.J., Bombay—Process of manufacturing shellac, button, lac, etc. will appear in due course.

3391 M.D.B., Ranigunj—Yellow soap, soft soap, etc. may be had of Koylash Chandra Dutt & Sons, 20, Bonfield Lane; Akhoy Kumar Laha, 1, Dharamtala Street and Chandi Charan Nayak, 124-1, Bow Bazar Street; all of Calcutta. Dyes may be had of Fuzlehusein & Bros., 44, Armenian Street and Champalal Agarwala, 45, Armenian Street; both of Calcutta.

3392 P.H.T., Bombay—Address of Indian Red Lead Factory Ltd. is 83, Russa Road, Tollygunge, Calcutta and address of D. Waldie & Co. Ltd., is A1, Clive Bldgs., Calcutta.

3393 U.P., Maur—Wirenail making machines may be had of Oriental Machinery Supplying

Agency Ltd., P12, Mission Row Extension, Calcutta.

3394 S.C., Maradankadaur—We have no book on penicillin manufacture. All the chemicals may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta. Waste celluloid may be available with cinema film distributors who dispose off rejected films at a very cheap price.

3395 S.C., Ishurdi—Process of manufacturing phenyle will be found in April 1950 issue of Industry.

3396 G.S.D., Nasik—Following is a list of tea merchants: B. K. Saha & Bros. Ltd., 5, Pollock Street; A. Tosh & Sons, 11-1, Harrison Road; Brooke Bond (India) Ltd., 2, Metcalfe Street and Dey Chandra & Co., 117-A, Raja Katra; all of Calcutta.

3397 R.K.R., Poona—An article on lemon chrome manufacture will be found in February 1951 issue of Industry. You have to invest at least Rs. 50000/- for starting manufacture of chrome colour and pigments. Particulars regarding production, consumption, export and import of the above are not available.

3398 R.C., Rohtak—Process of manufacturing casein will be found in Milk and Milk Products published from this office, price Rs. 3/7/- including postage.

3399 B.M.L.S., Brindaban—For lotteries enquire of Royal Calcutta Turf Club, 12, Russel Street, Calcutta. Process of manufacturing tobacco products will be found in Indian Tobacco and Its Preparation, published from this office, price Rs. 3/7/- including postage.

3400 J.S.D., Jamshedpur—For magnesium nitrate enquire of Nadia Chemical Works, C44-46, College Street Market, Calcutta.

3401 K.D.G., Chandausi—Process of manufacturing fountain pen ink appeared in April 1950 issue of Industry. You may also consult Manufacture of Ink published from this office, price Rs. 3/7/- including postage.

3402 A.K.S., Saran—Waxes may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane and Banshidhar Dutt, 126, Khengrapatty Street; both of Calcutta. Colours may be had of Fuzlehussein & Bros., 44, Armenian Street and Champalal Agarwala, 45, Armenian Street; both of Calcutta. cans may be had of Bengal Tin Box Mfg. Co. Ltd., 1, Jadu Nath Mitter Lane, Shambazar and National Sheet & Metal Works Ltd., 36A, Sahitya Parishad Street; both of Calcutta. Glass bottles may be had of Ananta Kumar Ghosh & Co., 8, Ezra Street and Bejoya Glass Depot, 4, Jackson Lane; both of Calcutta.

3403 R.K.C.W., Nuzvid—You have to use a furnace for dehydrating gypsum.

3404 R.S.W., Madras—Pearlash is potassium carbonate.

3405 S.H.A., Ajmer—You may consult Industry Year Book and Directory 1951 published from this office, price Rs. 16/4/- including postage.

3406 S.N.N., Muzaffarpur—Tablet making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta and Prabartak Commercial Corporation, 61, Bowbazar Street, Calcutta.

3408 R.N.B., Nasik—Following is a list of ayurvedic medicine dealers: Dacca Ayurvediya Pharmacy Ltd., 200-1, Rash Behari Avenue; Jogendra Ayurveda Ausadhalaya, 89, Upper Circular Road; Ayurved Bhaban Ltd., 44-1, Grey Street and Kaviraj N. N. Sen & Co. Ltd., 18-1, Lower Chitpur Road; all of Calcutta.

3409 H.D.S., Bombay—It is not possible to manufacture synthetic gum on a small scale as you have to use an electric furnace. Small electric furnace is not available. Process of manufacturing synthetic marble stone will appear in due course.

3410 S.I., Delhi—Collapsible tubes may be had of Metal Box Co. of India Ltd., B2, Hide Road, Calcutta.

3411 S.R.D., Banaras—You may start manufacture of dry colour. An article on lemon chrome manufacture will be found in February, 1951 issue of Industry.

3412 G.T.C., Kanpur—Following is the process of making naphthalene balls: The purified naphthalene is carefully melted at a low heat in an ordinary melting pot and ladled into the moulds with an iron ladle. Great care must be taken in melting the substance because at a high temperature it will ignite and burn causing a great loss to manufacturers. In casting iron wooden moulds are generally used. These are made in two halves connected together with pins in each half a number of hemispherical depressions are sunk in a line with a tube connecting them all together. At one end of the mould is a hole drilled for pouring in the melted mass. On cooling the liquid is solidified into bals, which may be separated by breaking off the attached pipe.

3413 I.T., Aligarh—A formula of pencil will be found in February 1951 issue of Industry.

3414 A.R.N., Marwar—All the addresses of foreign Trade Commissioners, Embassies, etc., will be found in Industry Year Book & Directory published from this office, price Rs. 16/4/- including postage. Address of Govt. of India Publication Dept. is Civil Lines, Delhi.

3415 S.P.A., Banaras—For preserving ink you should use carbolic acid—one ounce in 2 gal. of ink. Marking ink has good prospect in India at present. For removing silver stain chloride of copper is first applied to the tissue, it is next washed with hyposulphite of soda solution and afterwards with water.

3416 A.C.P., Banaras—Process of manufacturing amla hair oil, chyabanaprash, etc. will appear in due course.

3430 L.S.R., Galagandapur—We are not aware of any specific for filaria and elephantisis.

3431 D.S.N.D., Barpeta—Industrial machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension; T. E. Thomson & Co. Ltd., 9, Esplanade East and Small Machineries Mfg. Co., 22, R. G. Kar Road; all of Calcutta.

3432 V.A., Palani—Process of rubber block making and stove enamel signboard making will appear in due course.

3433 H.C.I., Lalitpur—For chemical test write to Government Test House. Alipur.

3434 L.S.U., Karnal—Process of manufacturing lead pencil will be found in Industry Prize Article I. published from this office, price Re. 1/15/- including postage.

3435 B.A., Nasik—Following is a list of ayurvedic institutes: Vaidya Sastra Pith & Hospital, 294-3 1, Upper Circular Road and Ashtanga Ayurved Vidyalaya, 177, Raja Dinendra Street; both of Calcutta.

3436 M.R., Secunderabad—Process of mirror making will be found in April 1950 issue of Industry.

3437 R.K.B., Lungleh—For grain crushing machines enquire of T. E. Thomson & Co. Ltd., 9, Esplanade East; Oriental Machinery Sup-' ing Agency Ltd., P12, Mission Row Extension and Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road; all of Calcutta.

3438 K.K.I., Faizabad—For pin making machines enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. You should use steel wire.

3439 N.P., Kuhuri—Before applying French polish use sandpaper and make the surface smooth and glossy. For plastic powder write to Imperial Chemical Industries (India) Ltd., 18, Strand Road, Calcutta. For glass instrument repairing write to Adair Dutt & Co. Ltd., Stephen House, 4, Dalhousie Square, Calcutta. For dynamo enquire of *General Electric Co. Ltd., Magnet House, Chittaranjan Avenue, Calcutta.*

3440 R.R.B., Ramachandrapuram—Centrifuged sugar machine may be had of Standard Machinery Co.. 67B, Netaji Subhas Road and Berry Bros., 15, Netaji Subhas Road; both of Calcutta.

3441 O.P.S., Delhi—You may consult Metal Casting published from this office, price Rs. 3/7/- including postage. It is not possible to manufacture white oil on small scale. For manufacturing glycerine you should use spent lye. There is no defect in the process.

3442 K.N.S., Kanauj—Following is a formula of bottle capping solution: Celluloid 5 parts; Acetone 50 parts; Benzene 20 parts; Amyl Acetate 25 parts. Mix and keep aside for a number of days. The approximate colour is then given with a spirit soluble aniline dye. Process of manufacturing camphor tablet appeared in January, 1951 issue of Industry.

3443 A.D.S., Bombay—Process of manufacturing arc-welding electrode will appear in due course.

3444 M.D.G., Ghaziabad—We have no book on wire-netting and strainer cloth.

—REVIEW OF BOOKS

INDUSTRIAL ORGANISATION IN INDIA by Mahesh Chand, M.A., B.Sc. (Hons.), and Shridhar Misra, M.A., Published by Premier Publishing Co., Fountain, Delhi. Pages 227, price Rs. 5.

A study of the industrial organisation as prevailing in the country is essential not only for those who want to be posted on the up-to-date developments and present position of the country in the economic sphere but also for those who are interested in future industrial planning. The book discusses the stages of economic evolution which is surely but slowly at work everywhere. Our national economy being closely intertwined with village life, village economy receives naturally a prior consideration. The author dwells at large with the various causes which stand in the way of India's agricultural progress, e.g., land tenure system, rural undebtedness. use of uneconomic tools, lack of cooperative endeavour, credit and finance, etc., etc. Manufacturing industries both the major ones and cottage industries have also received lucid treatment from the authors. Those dealt in are Coal, Iron and Steel, Cement, Cotton, Tea, Sugar, Paper, Match, Glass, Cottage industries in U. P. The present position and future prospects of these industries are surveyed in the book. Finally the whole system of marketing and organisation of trading business in the country has been studied. The book is planned for students of industrial organisations at the pro-University stage and will repay perusal.

A SURVEY OF INDIAN CONSTITUTIONALISM by P. Rajeswara Rao, Advocate. To be had of the Author, Eluru, W. Godavary. Pages 304, price Rs. 6/12/-.

The book makes a survey of the development of constitutionalism in India from the Vedic age down to the modern times. The book shows that democratic principles figured largely in the political tenets of the Vedic period. There are large number of references to substantiate that choice of a king was exercised by the people during the period. The book also describes the prevailing conceptions about governing a country during the Buddhistic age and Moghul period. It will be seen that the growth of Indian constitutionalism is not a novel feature of modern history. The times of Chandra Gupta saw the development of Local Self-Government. The best Revenue Administration was inaugurated and perfected in the time of Akbar by Todarmull. Representative Government has had thus its origin in India long before their introduction in the democracies of the West. British Rule only started from the beginning the consolidation of the constitutional ideas of the people and introduced reforms in stages. The book critically examines the constitutional work done by the East Indian Company and British Government during the eventful period covering the last centuries in India and describes the course of events leading to the Mountbatten Plan envisaging the partition of India and final decision by the British Government to withdraw from India.

With the inauguration of the Indian Republic constitutional changes on an unprecedented scale are taking shape. Special problems are arising in the constitutional field. The author describes in this connection the features of new constitution with reference to fundamental rights, commonwealth relationship, integration of states, Kashmir dispute, etc. The book gives in a small compass an intelligent view of the constitutional progress in recent years in India.

NOTICES & REVIEWS

(Manufacturers sending specimens and samples of their produits for notice and review may please note that no notice is published of medical preparations and allied substances in this section).

LABELS

We have received from Rajnagar Label Manufacturing Co., Opp. Hathibhai's Wadi, Outside Delhi Gate, Rajbhuvan, Ahmedabad, one sample book showing labels of different designs printed by them.

BATTERY SEPARATORS

We are glad to receive two good types of wooden battery separators manufactured by Himalaya Separators Factory, Dharamsala, Kangra.

TRADE ENQUIRIES

(To communicate with any party write to him direct with name and address given below mentioning Industry).

3184 Sarvesh Chandra, Moli Kol, Amroha, Moradabad—Wants to be put in touch with the suppliers of horn shaving to be used as manure.

3186 B.R., Tibarewala, Ratan Nagar, Bikaner—Wants to be put in touch with the suppliers of Himalayan herbs and drugs, cut and uncut semi-precious stones, glass beads, ayurvedic medicines, surma, etc.

3268 Greenland Manufacturing Co., Lady Jamshedji Road, Near Paradise Cinema, Mahim, Bombay—Want to be put in touch with the dealers in or suppliers of non-alsoholic solvents.

3284 H. N. Sahu, Colonelgunge, Allahabad —Wants to be put in touch with the importers of birds (ducks every variety) and rahoo fish in Calcutta.

3407 Bhaktalal Jujulal, 12/1, Asantola, Katmandu, Nepal—Wants to be put in touch with the suppliers of plastic goods, Italian coat buttons and hair grip.

3414 Abdur Rehman Nenaji, Bali, Marwar —Wants to be put in touch with the dealers in wooden blocks for cloth printing at Calcutta, Lucknow, Bombay and Farrukhabad.

THE

APRIL SPECIAL NUMBER

OF

INDUSTRY

WILL DISCUSS ELABORATELY HOW IMPROVEMENT CAN BE MADE IN* INDIAN SOILS AND CROPS *ON UP-TO-DATE SCIENTIFIC METHODS COMPRISING THE FOLLOWING :—

1. FORMATION OF SOILS.
2. PHYSICAL CLASSIFICATION OF SOILS.
3. CHEMICAL CLASSIFICATION OF SOILS.
4. TYPES OF INDIAN SOILS.
5. SPECIES OF CROPS TO BE CULTIVATED IN THESE SOILS.
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